Galaxy
SCIENCE FICTION

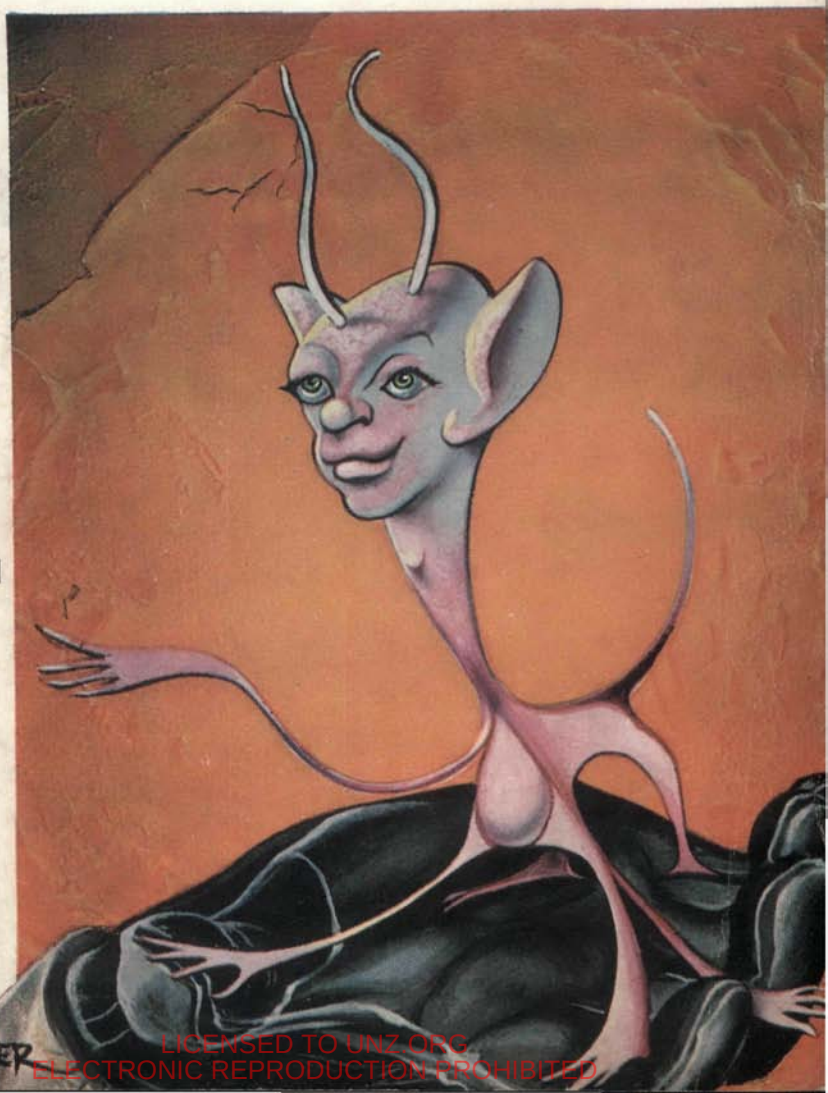
August 1967
60c

HAWKSBILL STATION
by
Robert Silverberg

ANGEL DARK ANGEL
by
Roger Zelazny

TRAVELERS GUIDE TO MEGAHOUSTON
by
H. H. Hollis

WILLY LEY,
ALGIS BUDRYS
AND MANY MORE



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Galaxy MAGAZINE

ALL STORIES NEW

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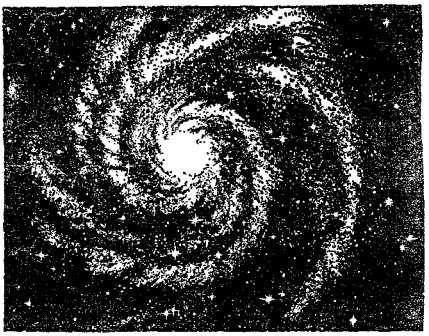

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S. F. AS A STEPPING STONE

A guest editorial by Isaac Asimov

Your editor and myself, for all that we are deep in late youth, still attend science-fiction conferences with the vigor and verve of teen-agers. We both attended Boskone IV, for instance; the regional convention held in Boston on April 1 and 2. And we both heard the tape-recording of a long symposium held at a convention in Great Britain concerning the "new wave" in science fiction.

I'm not sure I can tell you exactly what the "new wave" is, but I have noticed something that is becoming more and more prevalent in the s. f. of the sixties. Science fiction tends to be lacking in science these days. It has gone "mainstream" with just enough of a tang of the not-qnite-now and the not-quite-here to qualify it for inclusion in the genre.

I disapprove. I want science fiction. I think science fiction isn't really science fiction if it lacks science. And I think the better and truer the science, the better and truer the science fiction.

And the more important, too, for reasons that far transcend the field itself.

Consider that science fiction is, for writers, a stepping stone. It is almost impossible to make a good living out of science fiction alone, and those writers who really want to be professionals must expand in other directions.

In the primitive days before World War II, this meant that science-fiction writers wrote reams and reams of material for other specialties (weird, mystery, adventure, western) and for the comic books.

Nowadays, though, the standard of science-fiction writing has leaped ahead enormously, and

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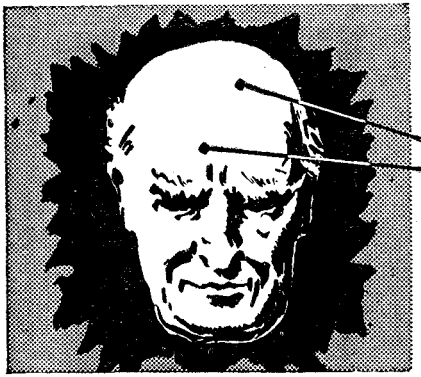

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those who can meet the literary requirements of magazines such as this one can go on to write for the slicks and for television. A number of s.f. writers whom we all know and love are now in the Hollywood big-time..

But . . . there is a very special future for the writer of *science* fiction.

Right now, the knowledgeable, skillful science writer is worth his weight in contracts. Show me a man who can write well and who knows his science thoroughly, and I'll show you one who will automatically have twice as much work as he can possibly handle, even if he were to write continuously.

You see, the need is great, and the double knowledge of scientific knowledge and literary skill is hard to supply. And where on earth would such a double fulfillment be attained? Why, from the ranks of the science-oriented science-fiction writers.

The question then is this: Will science fiction abandon science and act as a feeder for show business only?

To be sure, show business is very glamorous and the remuneration is (at its very best) equally glamorous. But on the other hand, I happen to know that science-writing can be very glamerous and remunerative, too, and you also get to keep your self-respect (if you're the kind that values such a thing.)

Then, too, show business is a very broad-based field of endeavor and can make do with almost any sort of material, as we all know. Nor does it strike to the heart; if quality suffers, so a few of us will be bored.

Science writing on the other hand has become the cement that holds our technology together. It is the bridge between the scientist and the layman, and even between the scientist of one specialty and of another.

Modern society needs such bridges badly; I might even say desperately. A second-rate performance here will do far more than merely increase boredom; it could, conceivably, contribute greatly to the asphyxiation of technology in the waste of its own over-supply of information. And in that way the material could be supplied for the eventual book to be entitled *The Decline and Fall of Earth* if anyone survived to write it.

So, I hope that science does not go entirely out of science fiction. I hope that when the New Wave has deposited its froth and receded, the vast and solid shore of *science* fiction will appear once more and continue to serve the good of humanity.

—Isaac Asimov

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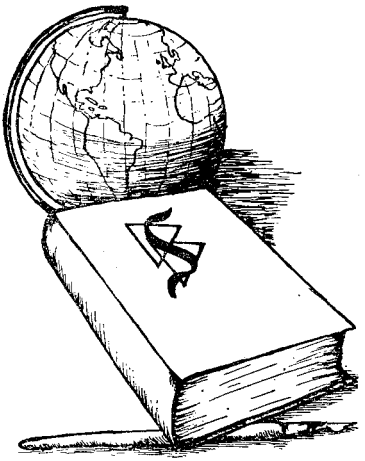

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HAWKSBILL STATION

by ROBERT SILVERBERG

Illustrated by FINLAY

They were unwanted men, the criminals, hurled back in time two billion years to rot and die!

Barrett was the uncrowned king of Hawksbill Station. He had been there the longest; he had suffered the most; he had the deepest inner resources of strength.

Before his accident, he had been able to whip any man in the place. Now he was a cripple, but he still had that aura of power that gave him command. When there were problems at the Station, they were brought to Barrett. That was axiomatic. He was the king.

He ruled over quite a kingdom, too. In effect it was the whole world, pole to pole, meridian to meridian. For what it was worth. It wasn't worth very much.

Now it was raining again. Bar-

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rett shrugged himself to his feet in the quick, easy gesture that cost him an infinite amount of carefully concealed agony and shuffled to the door of his hut. Rain made him impatient; the pounding of those great greasy drops against the corrugated tin roof was enough even to drive a Jim Barrett loony. He nudged the door open. Standing in the doorway, Barrett looked out over his kingdom.

Barren rock, nearly to the horizon. A shield of raw dolomite going on and on. Raindrops danced and bounced on that continental slab of rock. No trees. No grass. Behind Barrett's hut lay the sea, gray and vast. The sky was gray too, even when it wasn't raining.

He hobbled out into the rain. Manipulating his crutch was getting to be a simple matter for him now. He leaned comfortably, letting his crushed left foot dangle. A rockslide had pinned him last year during a trip to the edge of the Inland Sea. Back home, Barrett would have been fitted with prosthetics, and that would have been the end of it: a new ankle, a new instep, refurbished ligaments and tendons. But home was two billion years away; and home, there's no returning.

The rain hit him hard. Barrett was a big man, six and a half feet tall, with hooded dark eyes, a jutting nose, a chin that was a monarch among chins. He had weighed two hundred fifty pounds in his prime, in the good old agitating days when he had carried banners and pounded out manifestos. But now he was past sixty and beginning to shrink a little, the skin getting loose around the places where the mighty muscles used to be. It was hard to keep your weight in Hawksbill Station. The food was nutritious, but it lacked intensity. A man got to miss steak. Eating brachiopod stew and trilobite hash wasn't the same thing at all. Barrett was past all bitterness, though. That was another reason why the men regarded him as the leader. He didn't scowl. He didn't rant. He was resigned to his fate, tolerant of eternal exile, and so he could help the others get over that difficult heart-clawing period of transition.

A figure arrived, jogging through the rain: Norton. The doctrinaire Khrushchevist with the Trotskyite leanings. A small, excitable man who frequently appointed himself messenger whenever there was news at the Station. He sprinted toward Barrett's hut, slipping and sliding over the naked rocks.

Barrett held up a meaty hand.

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"Whoa, Charley. Take it easy or you'll break your neck!"

Norton halted in front of the hut. The rain had pasted the widely spaced strands of his brown hair to his skull. His eyes had the fixed, glossy look of fanaticism — or perhaps just astigmatism. He gasped for breath and staggered into the hut, shaking himself like a wet puppy. He obviously had run all the way from the main building of the Station, three hundred yards away — a long dash over rock that slippery.

"Why are you standing around in the rain?" Norton asked.

"To get wet," said Barrett, following him. "What's the news?"

"The Hammer's glowing. We're getting company."

"How do you know it's a live shipment?"

"It's been glowing for half an hour. That means they're taking precautions. They're sending a new prisoner. Anyway, no supply shipment is due."

Barrett nodded. "Okay. I'll come over. If it's a new man, we'll bunk him in with Latimer."

Norton managed a rasping laugh. "Maybe he's a materialist. Latimer will drive him crazy with all that mystic nonsense. We could put him with Altman."

"And he'll be raped in half an hour."

"Altman's off that kick now," said Norton. "He's trying to create a real woman, not looking for second-rate substitutes."

"Maybe our new man doesn't have any spare ribs."

"Very funny, Jim." Norton did not look amused. "You know what I want the new man to be? A conservative, that's what. A black-souled reactionary straight out of Adam Smith. God, that's what I want."

"Wouldn't you be happy with a fellow Bolshevik?"

"This place is full of Bolsheviks," said Norton. "Of all shades from pale pink to flagrant scarlet. Don't you think I'm sick of them? Sitting around fishing for trilobites and discussing the relative merits of Kerensky and Malenkov? I need somebody to *talk* to, Jim. Somebody I can fight with."

"All right," Barret said, slipping into his rain gear. "I'll see what I can do about hocusing a debating partner out of the Hammer for you. A rip-roaring objectivist, okay?" He laughed. "You know something, maybe there's been a revolution Up Front since we got our last man. Maybe the left is in and the right is out, and they'll start shipping us nothing *but* reactionaries. How would you like that? Fifty or a hundred storm troopers, Charley? Plenty of material

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"... Crushed left foot ..."

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to debate economics with. And the place will fill up with more and more of them, until we're outnumbered, and then maybe they'll have a *putsch* and get rid of all the stinking leftists sent here by the old regime, and —"

Barrett stopped. Norton was staring at him in amazement, his faded eyes wide, his hand compulsively smoothing his thinning hair to hide his embarassment.

Barrett realized that he had just committed one of the most heinous crimes possible at Hawksbill Station: he had started to run off at the mouth. There hadn't been any call for his little outburst. What made it more troublesome was the fact that *he* was the one who had permitted himself such a luxury. He was supposed to be the strong one of this place, the stabilizer, the man of absolute integrity and principle and sanity on whom the others could lean. And suddenly he had lost control. It was a bad sign. His dead foot was throbbing again; possibly that was the reason.

In a tight voice he said, "Let's go. Maybe the new man is here already."

They stepped outside. The rain was beginning to let up; the storm was moving out to sea. In the east over what would one day be the Atlantic, the sky was still clotted with gray mist, but to the west a different grayness was emerging, the shade of normal gray that meant dry weather. Before he had come out here, Barrett had expected to find the sky practically black, because there'd be fewer dust particles to bounce the light around and turn things blue. But the sky seemed to be weary beige. So much for advance theories.

Through the thinning rain they walked toward the main building. Norton accommodated himself to Barrett's limping pace, and Barret, wielding his crutch furiously, did his damndest not to let his infirmity slow them up. He nearly lost his footing twice and fought hard not to let Norton see.

Hawksbill Station spread out before them.

It covered about five hundred acres. In the center of everything was the main building, an ample dome that contained most of their equipment and supplies. At widely spaced intervals, rising from the rock shield like grotesque giant green mushrooms, were the plastic blisters of the individual dwellings. Some, like Barrett's, were shielded by tin sheeting salvaged from shipments from Up Front. Others

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stood unprotected, just as they had come from the mouth of the extruder.

The huts numbered about eighty. At the moment, there were a hundred forty inmates in Hawksbill Station, pretty close to the all-time high. Up Front hadn't sent back any hut-building materials for a long time, and so all the newer arrivals had to double up with bunkmates. Barrett and all those whose exile had begun before 2014 had the privilege of private dwellings, if they wanted them. (Some did not wish to live alone; Barrett, to preserve his own authority, felt that he was required to.) As new exiles arrived, they bunked in with those who currently lived alone, in reverse order of seniority. Most of the 2015 exiles had been forced to take roommates now. Another dozen deportees and the 2014 group would be doubling up. Of course, there were deaths all up and down the line, and there were plenty who were eager to have company in their huts.

Barrett felt, though, that a man who has been sentenced to life imprisonment ought to have the privilege of privacy, if he desires it. One of his biggest problems here was keeping people from cracking up because there was too little privacy. Propinquity could be intolerable in a place like this.

Norton pointed toward the big, shiny-skinned, green dome of the main building. "There's Altman going in now. And Rudiger. And Hutchett. Something's happening!"

Barret stepped up his pace. Some of the men entering the building saw his bulky figure coming over the rise in the rock and waved to him. Barrett lifted a massive hand in reply. He felt mounting excitement. It was a big event at the Station whenever a new man arrived. Nobody had come for six months, now. That was the longest gap he could remember. It had started to seem as though no one would ever come again.

That would be a catastrophe.

New men were all that stood between the older inmates and insanity. New men brought news from the future, news from the world that was eternally left behind. They contributed new personalities to a group that always was in danger of going stale.

And, Barrett knew, some men — he was not one — lived in the deluded hope that the next arrival might just turn out to be a woman.

That was why they flocked to the main building when the

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Hammer began to glow. Barrett hobbled down the path. The rain died away just as he reached the entrance.

Within, sixty or seventy Station residents crowded the chamber of the Hammer — just about every man in the place who was able in body and mind and still alert enough to show curiosity about a newcomer. They shouted greetings to Barrett. He nodded, smiled, deflected their questions with amiable gestures.

"Who's it going to be this time, Jim?"

"Maybe a girl, huh? Around nineteen years old, blonde, and built like — "

"I hope he can play stochastic chess, anyway."

"Look at the glow! It's deepening!"

Barrett, like the others, stared at the Hammer. The complex, involuted collection of unfathomable instruments burned a bright cherry red, betokening the surge of who knew how many kilowatts being pumped in at the far end of the line.

The glow was beginning to spread to the Anvil now, that broad aluminum bedplate on which all shipments from the future were dropped. In another moment —

"Condition Crimson!" somebody suddenly yelled. "Here he comes!"

II

Two billion years up the timeline, power was flooding into the real Hammer of which this was only the partial replica. A man — or something else, perhaps a shipment of supplies — stood in the center of the real Anvil, waiting for the Hawksbill Field to enfold him and kick him back to the early Paleozoic. The effect of time-travel was very much like being hit with a gigantic hammer and driven clear through the walls of the continuum: hence the governing metaphors for the parts of the machine.

Setting up Hawksbill Station had been a long, slow job. The Hammer had knocked a pathway and had sent back the nucleus of the receiving station, first. Since there was no receiving station on hand to receive the receiving station, a certain amount of waste had occurred. It wasn't necessary to have a Hammer and Anvil on the receiving end, except as a fine control to prevent temporal spread; without the equipment, the field wandered a little, and it was possible to scatter consecutive shipments over a span of twenty or thirty years. There was plenty of such temporal garbage all around Hawksbill Station, stuff that had been in-

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tended for original installation, but which because of tuning imprecisions in the pre-Hammer days had landed a couple of decades (and a couple of hundred miles) away from the intended site.

Despite such difficulties, they had finally sent through enough components to the master temporal site to allow for the construction of a receiving station. Then the first prisoners had gone through; they were technicians who knew how to put the Hammer and Anvil together. Of course, it was their privilege to refuse to cooperate. But it was to their own advantage to assemble the receiving station, thus making it possible for them to be sure of getting further supplies from Up Front. They had done the job. After that, outfitting Hawksbill Station had been easy.

Now the Hammer glowed, meaning that they had activated the Hawksbill Field on the sending end, somewhere up around 2028 or 2030 A.D. All the sending was done there. All the receiving was done here. It didn't work the other way. Nobody really knew why, although there was a lot of superficially profound talk about the rules of entropy.

There was a whining, hissing sound as the edges of the Hawksbill Field began to ionize the atmosphere in the room. Then came the expected thunderclap of implosion, caused by an imperfect overlapping of the quantity of air that was subtracted from this era and the quantity that was being thrust into it. And then, abruptly, a man dropped out of the Hammer and lay, stunned and limp, on the gleaming Anvil.

He looked young, which surprised Barrett considerably. He seemed to be well under thirty. Generally, only middle-aged men were sent to Hawksbill Station. Incorrigibles, who had to be separated from humanity for the general good. The youngest man in the place now had been close to forty when he arrived. The sight of this lean, cleancut boy drew a hiss of anguish from a couple of the men in the room, and Barrett understood the constellation of emotions that pained them.

The new man sat up. He stirred like a child coming out of a long, deep sleep. He looked around.

His face was very pale. His thin lips seemed bloodless. His blue eyes blinked rapidly. His jaws worked as though he wanted to say something, but could not find the words.

There were no harmful phy-

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siological effects to time-travel, but it could be a jolt to the consciousness. The last moments before the Hammer descended were very much like the final moments beneath the guillotine, since exile to Hawksbill Station was tantamount to a sentence of death. The departing prisoner took his last look at the world of rocket transport and artificial organs, at the world in which he had lived and loved and agitated for a political cause, and then he was rammed into the inconceivably remote past on a one-way journey. It was a gloomy business, and it was not very surprising that the newcomers arrived in a state of emotional shock.

Barrett elbowed his way through the crowd. Automatically, the others made way for him. He reached the lip of the Anvil and leaned over it, extending a hand to the new man. His broad smile was met by a look of blank bewilderment.

"I'm Jim Barrett. Welcome to Hawksbill Station. Here — get off that thing before a load of groceries lands on top of you." Wincing a little as he shifted his weight, Barrett pulled the new man down from the Anvil. It was altogether likely for the idiots Up Front to shoot another shipment along a minute after sending a man.

Barrett beckoned to Mel Rudiger, and the plump anarchist handed the new man an alcohol capsule. He took it and pressed it to his arm without a word. Charley Norton offered him a candy bar. The man shook it off. He looked groggy. A real case of temporal shock, Barrett thought, possibly the worst he had ever seen. The newcomer hadn't even spoken yet. Could the effect really be that extreme?

Barrett said, "We'll go to the infirmary and check you out. Then I'll assign you your quarters. There's time for you to find your way around and meet everybody later on. What's your name?"

"Hahn. Lew Hahn."

"I can't hear you."

"Hahn," the man repeated, still only barely audible.

"When are you from, Lew?"

"2029."

"You feel pretty sick?"

"I feel awful. I don't even believe this is happening to me. There's no such place as Hawksbill Station, is there?"

"I'm afraid there is," Barrett said.

"At least, for most of us. A few of the boys think it's all an illusion induced by drugs. But I have my doubts of that. If it's an illusion, it's a damned good one. Look."

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He put one arm around Hahn's shoulders and guided him through the press of prisoners, out of the Hammer chamber and toward the nearby infirmary. Although Hahn looked thin, even fragile, Barrett was surprised to feel the rippling muscles in those shoulders. He suspected that this man was a lot less helpless and ineffectual than he seemed to be right now. He *had* to be, in order to merit banishment to Hawksbill Station.

They passed the door of the building. "Look out there," Barrett commanded.

Hahn looked. He passed a hand across his eyes as though to clear away unseen cobwebs and looked again.

"A late Cambrian landscape," said Barrett quietly. "This would be a geologist's dream, except that geologists don't tend to become political prisoners, it seems. Out in front is the Appalachian Geosyncline. It's a strip of rock a few hundred miles wide and a few thousand miles long, from the Gulf of Mexico to Newfoundland. To the east we've got the Atlantic. A little way to the west we've got the Inland Sea. Somewhere two thousand miles to the west there's the Cordilleran Geosyncline, that's going to be California and Washington and Oregon someday. Don't hold your breath. I hope you like seafood."

Hahn stared, and Barrett, standing beside him at the doorway, stared also. You never got used to the alienness of this place, not even after you lived here twenty years, as Barrett had. It was Earth, and yet it was not really Earth at all, because it was somber and empty and unreal. The gray oceans swarmed with life, of course. But there was nothing on land except occasional patches of moss in the occasional patches of soil that had formed on the bare rock. Even a few cockroaches would be welcome; but insects, it seemed, were still a couple of geological periods in the future. To land-dwellers, this was a dead world, a world unborn.

Shaking his head, Hahn moved away from the door. Barrett led him down the corridor and into the small, brightly lit room that served as the infirmary. Doc Quesada was waiting. Quesada wasn't really a doctor, but he had been a medical technician once, and that was good enough. He was a compact, swarthy man with a look of complete self-assurance. He hadn't lost too many patients, all things considered. Barrett had watched him removing appendices with total aplomb. In his white smock, Quesada looked sufficiently medical to fit his role.

Barrett said, "Doc, this is Lew

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Hahn. He's in temporal shock. Fix him up."

Quesada nudged the newcomer onto a webfoam cradle and unzipped his blue jersey. Then he reached for his medical kit. Hawksbill Station was well equipped for most medical emergencies, now. The people Up Front had no wish to be inhumane, and they sent back all sorts of useful things, like anesthetics and surgical clamps and medicines and dermal probes. Barrett could remember a time at the beginning when there had been nothing much here but the empty huts; and a man who hurt himself was in real trouble.

"He's had a drink already," said Barrett.

"I see that," Quesada murmured. He scratched at his short-cropped, bristly mustache. The little diagnostat in the cradle had gone rapidly to work, flashing information about Hahn's blood pressure, potassium count, dilation index, and much else. Quesada seemed to comprehend the barrage of facts. After a moment he said to Hahn, "You aren't really sick, are you? Just shaken up a little. I don't blame you. Here — I'll give you a quick jolt to calm your nerves, and you'll be all right. As all right as any of us ever are."

He put a tube to Hahn's carotid and thumbed the snout. The subsonic whirred, and a tranquilizing compound slid into the man's bloodstream. Hahn shivered.

Quesada said, "Let him rest for five minutes. Then he'll be over the hump."

They left Hahn in his cradle and went out of the infirmary. In the hall, Barrett looked down at the little medic and said, "What's the report on Valdosto?"

Valdosto had gone into psychotic collapse several weeks before. Quesada was keeping him drugged and trying to bring him slowly back to the reality of Hawksbill Station. Shrugging, he replied, "The status is quo. I let him out from under the dream-juice this morning, and he was the same as he's been."

"You don't think he'll come out of it?"

"I doubt it. He's cracked for keeps. They could paste him together Up Front, but — "

"Yeah," Barrett said. If he could get Up Front at all, Valdosto wouldn't have cracked. "Keep him happy, then. If he can't be sane, he can at least be comfortable. What about Altman? Still got the shakes?"

"He's building a woman."

"That's what Charley Norton told me. What's he using? A rag, a bone — "

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"I gave him surplus chemicals. Chosen for their color, mainly. He's got some foul green copper compounds and a little bit of ethyl alcohol and six or seven other things, and he collected some soil and threw in a lot of dead shellfish, and he's sculpting it all into what he claims is female shape and waiting for lightning to strike it."

"In other words, he's gone crazy," Barrett said.

"I think that's a safe assumption. But he's not molesting his friends any more, anyway. You didn't think his homosexual phase would last much longer, as I recall."

"No, but I didn't think he'd go off the deep end. If a man needs sex and he can find some consenting playmates here, that's quite all right with me. But when he starts putting a woman together out of some dirt and rotten brachiopod meat it means we've lost him. It's really just too bad."

Quesada's dark eyes flickered. "We're all going to go that way sooner or later, Jim."

"I haven't. You haven't."

"Give us time. I've only been here eleven years."

"Altman's been here only eight. Valdosto even less."

"Some shells crack faster than others," said Quesada. "Here's our new friend.

Hahn had come out of the infirmary to join them. He still looked pale, but the fright was gone from his eyes. He was beginning to adjust to the unthinkable.

He said, "I couldn't help overhearing your conversation. Is there a lot of mental illness here?"

"Some of the men haven't been able to find anything meaningful to do here," Barrett said. "It eats them away. Quesada here has his medical work. I've got administrative duties. A couple of the fellows are studying the sea life. We've got a newspaper to keep some busy. But there are always those who just let themselves slide into despair, and they crack up. I'd say we have thirty or forty certifiable maniacs here at the moment, out of a hundred forty residents."

"That's not so bad," Hahn said. "Considering the inherent instability of the men who get sent here and the unusual conditions of life here."

Barrett laughed. "Hey, you're suddenly pretty articulate, aren't you? What was in the stuff Doc Quesada jolted you with?"

"I didn't mean to sound superior," Hahn said quickly. "Maybe that came out a little too smug. I mean — "

"Forget it. What did you do Up Front, anyway?"

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"I was sort of an economist."

"Just what we need," said Quesada. "He can help us solve our balance-of-payments problem."

Barrett said, "If you were an economist, you'll have plenty to discuss here. This place is full of economic theorists who'll want to bounce their ideas off you. Some of them are almost sane, too. Come with me and I'll show you where you're going to stay."

III

The path from the main building to the hut of Donald Latimer was mainly downhill, for which Barrett was grateful even though he knew that he'd have to negotiate the uphill return in a little while. Latimer's hut was on the eastern side of the Station, looking out over the ocean. They walked slowly toward it. Hahn was solicitious of Barrett's game leg, and Barrett was irritated by the exagerrated care the younger man took to keep pace with him.

He was puzzled by this Hahn. The man was full of seeming contradictions -- showing up here with the worst case of arrival shock Barrett had even seen, then snapping out of it with remarkable quickness; looking frail and shy, but hiding solid muscles inside his jersey; giving an outer appearance of incompetence, but speaking with calm control. Barrett wondered what this young man had done to earn him the trip to Hawksbill Station, but there was time for such inquiries later. All the time in the world.

Hahn said, "Is everything like this? Just rock and ocean?"

"That's all. Land life hasn't evolved yet. Everything's wonderfully simple, isn't it? No clutter. No urban sprawl. There's some moss moving onto land, but not much."

"And in the sea? Swimming dinosaurs?"

Barrett shook his head. "There won't be any vertebrates for half a billion years. We don't even have fish yet, let alone reptiles out there. All we can offer is that which creepeth. Some shellfish, some big fellows that look like squids and trilobites. Seven hundred billion different species of trilobites. We've got a man named Rudiger — he's the one who gave you the drink — who's making a collection of them. He's writing the world's definitive text on trilobites."

"But nobody will ever read it in — in the future."

"Up Front, we say."

"Up Front."

"That's the pity of it," said Barrett. "We told Rudiger to inscribe his book on imperishable

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plates of gold and hope that it's found by paleontologists. But he says the odds are against it. Two billion years of geology will chew his plates to hell before they can be found."

Hahn sniffed. "Why does the air smell so strange?"

"It's a different mix," Barrett said. "We've analyzed it. More nitrogen, a little less oxygen, hardly any CO_2 at all. But that isn't really why it smells odd to you. The thing is, it's pure air, unpolluted by the exhalations of life. Nobody's been respiring into it but us lads, and there aren't enough of us to matter."

Smiling, Hahn said, "I feel a little cheated that it's so empty. I expected lush jungles of weird plants and pterodactyls swooping through the air and maybe a tyrannosaur crashing into a fence around the Station."

"No jungles. No pterodactyls. No tyrannosaurs. No fences. You didn't do your homework."

"Sorry."

"This is the late Cambrian. Sea life exclusively."

"It was very kind of them to pick such a peaceful era as the dumping ground for political prisoners," Hahn said. "I was afraid it would be all teeth and claws."

"Kind, hell! They were looking for an era where we couldn't do any harm. That meant tossing us back before the evolution of mammals, just in case we'd accidentally got hold of the ancestor of all humanity and snuff him out. And while they were at it, they decided to stash us so far in the past that we'd be beyond all land life, on the theory that maybe even if we slaughtered a baby dinosaur it might affect the entire course of the future."

"They don't mind if we catch a few trilobites?"

"Evidently they think it's safe," Barrett said. "It looks as though they were right. Hawksbill Station has been here for twenty-five years, and it doesn't seem as though we've tampered with future history in any measurable way. Of course, they're careful not to send us any women."

"Why is that?"

"So we don't start reproducing and perpetuating ourselves. Wouldn't that mess up the timelines? A successful human outpost in two billion B.C., that's had all that time to evolve and mutate and grow? By the time the twenty-first century came around, our descendants would be in charge, and the other kind of human being would probably be in penal servitude, and there'd be more paradoxes created than you could shake a trilobite at.

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So they don't send the women here. There's a prison camp for women, too, but it's a few hundred million years up the time-line in the late Silurian, and never the twain shall meet. That's why Ned Altman's trying to build a woman out of dust and garbage."

"God made Adam out of less."

"Altman isn't God," Barrett said. "That's the root of his whole problem. Look, here's the hut where you're going to stay. I'm rooming you with Don Latimer. He's a very sensitive, interesting, pleasant person. He used to be a physicist before he got into politics, and he's been here about a dozen years, and I might as well warn you that he's developed a strong and somewhat cockeyed mystic streak lately. The fellow he was rooming with killed himself last year, and since then he's been trying to find some way out of here through extra-sensory powers."

"Is he serious?"

"I'm afraid he is. And we try to take him seriously. We all humor each other at Hawksbill Station; it's the only way we avoid a mass psychosis. Latimer will probably try to get you to collaborate with him on his project. If you don't like living with him, I can arrange a transfer for you. But I want to see how he reacts to someone new at the Station. I'd like you to give him a chance."

"Maybe I'll even help him find his psionic gateway."

"If you do, take me along," said Barrett. They both laughed. Then he rapped at Latimer's door. There was no answer, and after a moment Barrett pushed the door open. Hawksbill Station had no locks.

Latimer sat in the middle of the bare rock floor, cross-legged, meditating. He was a slender, gentle-faced man just beginning to look old. Right now he seemed a million miles away, ignoring them completely. Hahn shrugged. Barrett put a finger to his lips. They waited in silence for a few minutes, and then Latimer showed signs of coming up from his trance.

He got to his feet in a single flowing motion, without using his hands. In a low, courteous voice he said to Hahn, "Have you just arrived?"

"Within the last hour. I'm Lew Hahn."

"Donald Latimer. I regret that I have to make your acquaintance in these surroundings. But maybe we won't have to tolerate this illegal imprisonment much longer."

Barrett said, "Don, Lew is going to bunk with you. I think you'll get along well. He was

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an economist in 2029 until they gave him the Hammer."

"Where do you live?" Latimer asked, animation coming into his eyes.

"San Francisco."

The glow faded. Latimer said, "Were you ever in Toronto? I'm from there. I had a daughter — she'd be twenty-three now, Nella Latimer. I wondered if you knew her."

"No. I'm sorry."

"It wasn't very likely. But I'd love to know what kind of a woman she became. She was a little girl when I last saw her. Now I guess she's married. Or perhaps they've sent her to the other Station. Nella Latimer — you're sure you didn't know her?"

Barrett left them together. It looked as though they'd get along. He told Latimer to bring Hahn up to the main building at dinner for introductions and went out. A chilly drizzle had begun again. Barrett made his way slowly, painfully up the hill. It had been sad to see the light flicker from Latimer's eyes when Hahn said he didn't know his daughter. Most of the time, men at Hawksbill Station tried not to speak about their families, preferring to keep those tormenting memories well repressed. But the arrival of newcomers generally stirred old ties. There was never any news of relatives and no way to obtain any, because it was impossible for the Station to communicate with anyone Up Front. No way to ask for the photo of a loved one, no way to request specific medicines, no way to obtain a certain book or a coveted tape. In a mindless, impersonal way, Up Front sent periodic shipments to the Station of things thought useful — reading matter, medical supplies, technical equipment, food. Occasionally they were startling in their generosity, as when they sent a case of Burgundy, or a box of sensory spools, or a recharger for the power pack. Such gifts usually meant a brief thaw in the world situation, which customarily produced a short-lived desire to be kind to the boys in Hawksbill Station. But they had a policy about sending information about relatives. Or about contemporary newspapers. Fine wine, yes; a tridim of a daughter who would never be seen again, no.

For all Up Front knew, there was no one alive in Hawksbill Station. A plague could have killed everyone off ten years ago, but there was no way of telling. That was why the shipments still came back. The government whirred and clicked with predictable continuity. The government, whatever else it might be,

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was not malicious. There were other kinds of totalitarianism besides bloody repressive tyranny.

Pausing at the top of the hill, Barrett caught his breath. Naturally, the alien air no longer smelled strange to him. He filled his lungs with it. Once again the rain ceased. Through the grayness came the sunshine, making the naked rocks sparkle. Barrett closed his eyes a moment and leaned on his crutch and saw, as though on an inner screen, the creatures with many legs climbing up out of the sea, and the mossy carpets spreading, and the flowerless plants uncoiling and spreading their scaly branches, and the dull hides of eerie amphibians glistening on the shores and the tropic heat of the coal-forming epoch descending like a glove over the world.

All that lay far in the future. Dinosaurs. Little chittering mammals. Pithecanthropus in the forests of Java. Sargon and Hannibal and Attila and Orville Wright and Thomas Edison and Edmond Hawksbill. And finally a benign government that would find the thoughts of some men so intolerable that the only safe place to which they could be banished was a rock at the beginning of time. The government was too civilized to put men to death for subversive activities and too cowardly to let them remain alive. The compromise was the living death of Hawksbill Station. Two billion years of impassable time was suitable insulation even for the most nihilistic idea.

Grimacing a little, Barrett struggled the rest of the way back toward his hut. He had long since come to accept his exile, but accepting his ruined foot was another matter entirely. The idle wish to find a way to regain the freedom of his own time no longer possessed him; but he wished with all his soul that the blank-faced administrators Up Front would send back a kit that would allow him to rebuild his foot.

He entered his hut and flung his crutch aside, sinking down instantly on his cot. There had been no cots when he had come to Hawksbill Station. He had come here in the fourth year of the Station, when there were only a dozen buildings and little in the way of creature comforts. It had been a miserable place, then, but the steady accretion of shipments from Up Front had made it relatively tolerable. Of the fifty or so prisoners who had preceded Barrett to Hawksbill, none remained alive. He had held the highest seniority for almost ten years. Time moved here at one-to-one correlation with time Up

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Front; the Hammer was locked on this point of time, so that Hahn, arriving here today more than twenty years after Barrett, had departed from a year Up Front more than twenty years after the time of Barrett's expulsion. Barrett had not had the heart to begin pumping Hahn for news of 2029 so soon. He would learn all he needed to know, and small cheer it would be, anyway.

Barret reached for a book. But the fatigue of hobbling around the station had taken more out of him than he realized. He looked at the page for a moment. Then he put it away and closed his eyes and dozed.

IV

That evening, as every evening, the men of Hawksbill Station gathered in the main building for dinner and recreation. It was not mandatory, and some men chose to eat alone. But tonight nearly everyone who was in full possession of his faculties was there, because this was one of the infrequent occasions when a newcomer had arrived to be questioned about the world of men.

Hahn looked uneasy about his sudden notoriety. He seemed to be basically shy, unwilling to accept all the attention now being thrust upon him. There he sat in the middle of the group while men twenty and thirty years his senior crowded in on him with their questions, and it was obvious that he wasn't enjoying the session.

Sitting to one side, Barrett took little part in the discussion. His curiosity about Up Front's ideological shifts had ebbed a long time ago. It was hard for him to realize that he had once been so passionately concerned about concepts like syndicalism and the dictatorship of the proletariat and the guaranteed annual wage that he had been willing to risk imprisonment over them. His concern for humanity had not waned, merely the degree of his involvement in the twenty-first century's political problems. After twenty years at Hawksbill Station, Up Front had become unreal to Jim Barrett, and his energies centered around the crises and challenges of what he had come to think of as "his own" time — the late Cambrian.

So he listened, but more with an ear for what the talk revealed about Lew Hahn than for what it revealed about current events Up Front. And what it revealed about Lew Hahn was mainly a matter of what was not revealed.

Hahn didn't say much. He

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seemed to be feinting and evading.

Charley Norton wanted to know, "Is there any sign of a weakening of the phony conservatism yet? I mean, they've been promising the end of big government for thirty years, and it gets bigger all the time."

Hahn moved restlessly in his chair. "They still promise. As soon as conditions become stabilized — "

"Which is when?"

"I don't know. I suppose they're making words."

"What about the Martian Commune?" demanded Sid Hutchett. "Have they been infiltrating agents onto Earth?"

"I couldn't really say."

"How about the Gross Global Product?" Mel Rudiger wanted to know. "What's its curve? Still holding level, or has it started to drop?"

Hahn tugged at his ear. "I think it's slowly edging down."

"Where does the index stand?" Rudiger asked. "The last figures we had, for '25, it was at 909. But in four years — "

"It might be something like 875 now," said Hahn.

It struck Barrett as a little odd that an economist would be so hazy about the basic economic statistic. Of course, he didn't know how long Hahn had been imprisoned before getting the Hammer. Maybe he simply wasn't up on the recent figures. Barrett held his peace.

Charley Norton wanted to find out some things about the legal rights of citizens. Hahn couldn't tell him. Rudiger asked about the impact of weather control — whether the supposedly conservative government of liberators was still ramming programmed weather down the mouths of the citizens — and Hahn wasn't sure. Hahn couldn't rightly say much about the functions of the judiciary, whether it had recovered any of the power stripped from it by the Enabling Act of '18. He didn't have any comments to offer on the tricky subject of population control. In fact, his performance was striking for its lack of hard information.

"He isn't saying much at all," Charley Norton grumbled to the silent Barrett. "He's putting up a smokescreen. But either he's not telling what he knows, or he doesn't know."

"Maybe he's not very bright," Barrett suggested.

"What did he do to get here? He must have had some kind of deep committment. But it doesn't show, Jim! He's an intelligent kid, but he doesn't seem plugged in to anything that ever mattered to any of us."

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Doc Quesada offered a thought. "Suppose he isn't a political at all. Suppose they're sending a different kind of prisoner back now. Axe murderers, or something. A quiet kid who quietly chopped up sixteen people one Sunday morning. Naturally he isn't interested in politics."

Barrett shook his head. "I doubt that. I think he's just clamming up because he's shy or ill at ease. It's his first night here, remember. He's just been kicked out of his own world and there's no going back. He may have left a wife and baby behind, you know. He may simply not give a damn tonight about sitting up there and spouting the latest word on abstract philosophical theory, when all he wants to do is go off and cry his eyes out. I say we ought to leave him alone."

Quesada and Norton looked convinced. They shook their heads in agreement; but Barrett didn't voice his opinion to the room in general. He let the quizzing of Hahn continue until it petered out of its own accord. The men began to drift away. A couple of them went in back to convert Hahn's vague generalities into the lead story for the next handwritten edition of of the Hawksbill Station *Times*. Rudiger stood on a table and shouted out that he was going night fishing, and four men asked to join him. Charley Norton sought out his usual debating partner, the nihilist Ken Belardi, and reopened, like a festering wound, their discussion of planning versus chaos, which bored them both to the point of screaming. The nightly games of stochastic chess began. The loners who had made rare visits to the main building simply to see the new man went back to their huts to do whatever they did in them alone each night.

Hahn stood apart, fidgeting and uncertain.

Barrett went up to him. "I guess you didn't really want to be quizzed tonight," he said.

"I'm sorry I couldn't have been more informative. I've been out of circulation a while, you see."

"But you were politically active, weren't you?"

"Oh, yes," Hahn said. "Of course," He flicked his tongue over his lips. "What's suposed to happen now?"

"Nothing in particular. We don't have organized activities here. Doc and I are going out on sick call. Care to join us?"

"What does it involve?" Hahn asked.

"Visiting some of the worst cases. It can be grim, but you'll

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get a panoramic view of Hawksbill Station in a hurry."

"I'd like to go."

Barrett gestured to Quesada, and the three of them left the building. This was a nightly ritual for Barrett, difficult as it was since he had hurt his foot. Before turning in, he visited the goofy ones and the psycho ones and the catatonic ones, tucked them in, wished them a good night and a healed mind in the morning. Someone had to show them that he cared. Barrett did.

Outside, Hahn peered up at the moon. It was nearly full tonight, shining like a burnished coin, its face a pale salmon color and hardly pockmarked at all.

"It looks so different here," Hahn said. "The craters — where are the craters?"

"Most of them haven't been formed yet," said Barrett. "Two billion years is a long time even for the moon. Most of its upheavals are still ahead. We think it may still have an atmosphere, too. That's why it looks pink to us. Of course, Up Front hasn't bothered to send us much in the way of astronomical equipment. We can only guess."

Hahn started to say something. He cut himself off after one blurted syllable.

Quesada said, "Don't hold it back. What were you about to suggest?"

Hahn laughed in self-mockery. "That you ought to fly up there and take a look. It struck me as odd that you'd spend all these years here theorizing about whether the moon's got an atmosphere and wouldn't ever once go up to look. But I forgot."

"It would be useful to have a commut ship from Up Front," Barrett said. "But it hasn't occurred to them. All we can do is look. The moon's a popular place in '29, is it?"

"The biggest resort in the system," Hahn said. "I was there on my honeymoon. Leah and I — "

He stopped again.

Barrett said hurriedly, "This is Bruce Valdosto's hut. He cracked up a few weeks ago. When we go in, stand behind us so he doesn't see you. He might be violent with a stranger. He's unpredictable."

Valdosto was a husky man in his late forties, with swarthy skin, coarse curling black hair, and the broadest shoulders any man had ever had. Sitting down, he looked even burlier than Jim Barrett, which was saying a great deal. But Valdosto had short, stumpy legs, the legs of a man of ordinary stature tacked to the trunk of a giant, which spoiled the effect completely. In his years Up Front he had totally re-

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fused any prosthesis. He believed in living with deformities.

Right now he was strapped into a webfoam cradle. His domed forehead was flecked with beads of sweat, his eyes were glittering beadily in the darkness. He was a very sick man. Once he had been clear-minded enough to throw a sleet bomb into a meeting of the Council of Syndics, giving a dozen of them a bad case of gamma poisoning, but now he scarcely knew up from down, right from left.

Barrett leaned over him and said, "How are you, Bruce?"

"Who's that?"

"Jim. It's a beautiful night, Bruce. How'd you like to come outside and get some fresh air? The moon's almost full."

"I've got to rest. The committee meeting tomorrow — "

"It's been postponed."

"But how can it? The Revolution — "

"That's been postponed too. Indefinitely."

"Are they disbanding the cells?" Valdosto asked harshly.

"We don't know yet. We're waiting for orders. Come outside, Bruce. The air will do you good."

Muttering, Valdosto let himself be unlaced. Quesada and Barrett pulled him to his feet and propelled him through the door of the hut. Barrett caught sight of Hahn in the shadows, his face somber with shock.

They stood together outside the hut. Barrett pointed to the moon. "It's got such a lovely color here. Not like the dead thing Up Front. And look, look down there, Bruce. The sea breaking on the rocky shore. Rudiger's out fishing. I can see his boat by moonlight."

"Striped bass," said Valdosto. "Sunnies. Maybe he'll catch some sunnies."

"There aren't any sunnies here. They haven't evolved yet." Barrett fished in his pocket and drew out something ridged and glossy, about two inches long. It was the exoskelton of a small trilobite. He offered it to Valdosto, who shook his head.

"Don't give me that cockeyed crab."

"It's a trilobite, Bruce. It's extinct, but so are we. We're two billion years in our own past."

"You must be crazy," Valdosto said in a calm, low voice that belied his wild-eyed appearance. He took the trilobite from Barrett and hurled it against the rocks. "Cockeyed crab," he muttered.

Quesada shook his head sadly. He and Barrett led the sick man into the hut again. Valdosto did not protest as the medic gave him the sedative. His weary mind, rebelling entirely

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against the monstrous concept that he had been exiled to the inconceivably remote past, welcomed sleep.

When they went out Barrett saw Hahn holding the trilobite on his palm and staring at it in wonder. Hahn offered it to him, but Barrett brushed it away. "Keep it if you like," he said. "There are more."

They went on. They found Ned Altman beside his hut, crouching on his knees and patting his hands over the crude, lopsided form of what, from its exaggerated breasts and hips, appeared to be the image of a woman. He stood up when they appeared. Altman was a neat little man with yellow hair and nearly invisible white eyebrows. Unlike anyone else in the Station, he had actually been a government man once, fifteen years ago, before seeing through the myth of syndicalist capitalism and joining one of the underground factions. Eight years at Hawkskill Station had done things to him.

Altman pointed to his golem and said, "I hoped there'd be lightning in the rain today. That'll do it, you know. But there isn't much lightning this time of year. She'll get up alive, and then I'll need you, Doc, to give her her shots and trim away some of the rough places."

Quesada forced a smile. "I'll be glad to do it, Ned. But you know the terms."

"Sure. When I'm through with her, you get her. You think I'm a goddam monopolist? I'll share her. There'll be a waiting list. Just so you don't forget who made her, though. She'll remain mine, whenever I need her." He noticed Hahn. "Who are you?"

"He's new," Barrett said. "Lew Hahn. He came this afternoon."

"Ned Altman," said Altman with a courtly bow. "Formerly in government service. You're pretty young, aren't you? How's your sex orientation? Hetero?"

Hahn winced. "I'm afraid so."

"It's okay. I wouldn't touch you. I've got a project going, here. But I just want you to know, I'll put you on my list. You're young and you've probably got stronger needs than some of us. I won't forget about you, even though you're new here."

Quesada coughed. "You ought to get some rest now, Ned. Maybe there'll be lightning tomorrow."

Altman did not resist. The doctor took him inside and put him to bed, while Hahn and Barrett surveyed the man's handiwork. Hahn pointed toward the figure's middle.

"He's left out something essential," he said. "If he's plan-

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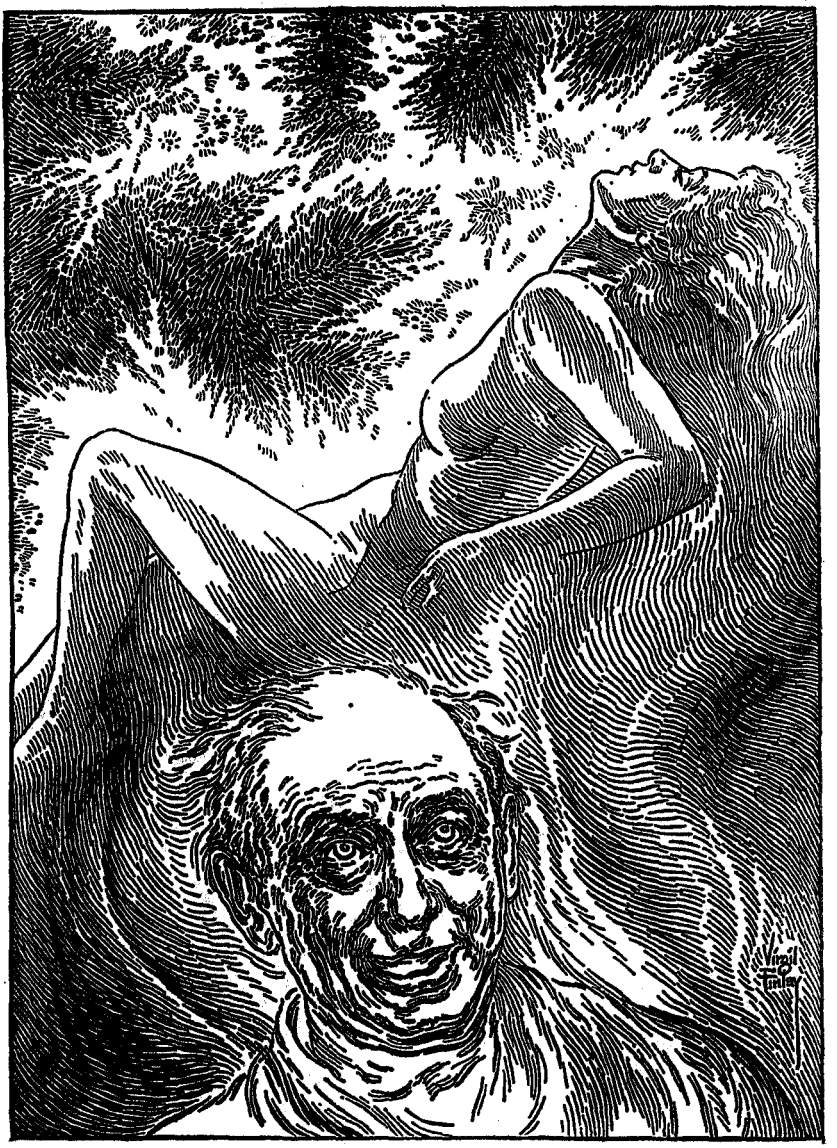

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ning to make love to this girl after he's finished creating her, he'd better — "

"It was there yesterday," said Barrett. "He must be changing orientation again." Quesada emerged from the hut. They went on, down the rocky path.

Barrett did not make the complete circuit that night. Ordinarily, he would have gone all the way down to Latimer's hut overlooking the sea, for Latimer was on his list of sick ones. But Barrett had visited Latimer once that day, and he didn't think his aching good leg was up to another hike that far. So after he and Quesada and Hahn had been to all of the easily accessible huts and had visited the man who prayed for alien beings to rescue him and the man who was trying to break into a parallel universe where everything was as it ought to be in the world and the man who lay on his cot sobbing for all his wakeful hours, Barrett said goodnight to his companions and allowed Quesada to escort Hahn back to his hut without him.

After observing Hahn for half a day, Barrett realized he did not know much more about him than when he had first dropped onto the Anvil. That was odd. But maybe Hahn would open up a little more, after he'd been here a while. Barrett stared up at the salmon moon and reached into his pocket to finger the little trilobite before he remembered that he had given it to Hahn. He shuffled into his hut. He wondered how long ago Hahn had taken that lunar honeymoon trip.

V

Rudiger's catch was spread out in front of the main building the next morning when Barrett came up for breakfast. He had had a good night's fishing, obviously. He usually did. Rudiger went out three or four nights a week, in a little dinghy that he had cobbled together a few years ago from salvaged materials, and he took with him a team of friends whom he had trained in the deft use of the trawling nets.

It was an irony that Rudiger, the anarchist, the man who believed in individualism and the abolition of all political institutions, should be so good at leading a team of fishermen. Rudiger didn't care for teamwork in the abstract. But it was hard to manipulate the nets alone, he had discovered. Hawksbill Station had many little ironies of that sort. Political theorists tend to swallow their theories when forced back on pragmatic measures of survival.

The prize of the catch was a

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cephalopod about a dozen feet long — a rigid conical tube out of which some limp squid-like tentacles dangled. Plenty of meat on that one, Barrett thought. Dozens of trilobites were arrayed around it, ranging in size from the inch-long kind to the three-footers with their baroquely involuted exoskeletons. Rudiger fished both for food and for science; evidently these tribolites were discards, species that he already had studied, or he wouldn't have left them here to go into the food hoppers. His hut was stacked ceiling-high with trilobites. It kept him sane to collect and analyze them, and no one begrudged him his hobby.

Near the heap of trilobites were some clusters of hinged brachiopods, looking like scallops that had gone awry, and a pile of snails. The warm, shallow waters just off the coastal shelf teemed with life, in striking contrast to the barren land. Rudiger had also brought in a mound of shiny black seaweed. Barrett hoped someone would gather all this stuff up and get it into their heat-sink cooler before it spoiled. The bacteria of decay worked a lot slower here than they did Up Front, but a few hours in the mild air would do Rudiger's haul no good.

Today Barrett planned to recruit some men for the annual Inland Sea expedition. Traditionally, he led that trek himself, but his injury made it impossible for him even to consider going any more. Each year, a dozen or so able-bodied men went out on a wide-ranging reconnaissance that took them in a big circle, looping northwestward until they reached the sea, then coming around to the south and back to the Station. One purpose of the trip was to gather any temporal garbage that might have materialized in the vicinity of the Station during the past year. There was no way of knowing how wide a margin of error had been allowed during the early attempts to set up the Station, and the scattershot technique of hurling material into the past had been pretty unreliable. New stuff was turning up all the time that had been aimed for Minus Two Billion, Two Thousand Oh Five A. D., but which didn't get there until a few decades later. Hawksbill Station needed all the spare equipment it could get, and Barrett didn't miss a chance to round up any of the debris.

There was another reason for the Inland Sea expeditions, though. They served as a focus for the year, an annual ritual, something to peg a custom to. It was a rite of spring here.

The dozen strongest men, go-

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ing on foot to the distant rock-rimmed shores of the tepid sea that drowned the middle of North America, were performing the closest thing Hawksbill Station had to a religious function, although they did nothing more mystical when they reached the Inland Sea than to net a few trilobites and eat them. The trip meant more to Barrett himself than he had ever suspected, also. He realized that now, when he was unable to go. He had led every such expedition for twenty years.

But last year he had gone scrabbling over boulders loosened by the tireless action of the waves, venturing into risky territory for no rational reason that he could name, and his aging muscles had betrayed him. Often at night he woke sweating to escape from the dream in which he relived that ugly moment: slipping and sliding, clawing at the rocks, a mass of stone dislodged from somewhere and came crashing down with an agonizing impact on his foot, pinning him, crushing him. He could not forget the sound of grinding bones. Nor was he likely to lose the memory of the homeward march, across hundreds of miles of bare rock, his bulky body slung between the bowed forms of his companions.

He thought he would lose the foot, but Quesada had spared him from the amputation. He simply could not touch the foot to the ground and put weight on it now, or ever again. It might have been simpler to have the dead appendage sliced off. Quesada vetoed that, though. "Who knows," he had said, "some day they might send us a transplant kit. I can't rebuild a leg that's been amputated." So Barrett had kept his crushed foot. But he had never been quite the same since, and now someone else would have to lead the march.

Who would it be, he asked himself?

Quesada was the likeliest. Next to Barrett, he was the strongest man here, in all the ways that it was important to be strong. But Quesada couldn't be spared at the Station. It might be handy to have a medic along on the trip, but it was vital to have one here. After some reflection Barrett put down Charley Norton as the leader. He added Ken Belardi — someone for Norton to talk to. Rudiger? A tower of strength last year after Barrett had been injured; Barrett didn't particularly want to let Rudiger leave the Station so long though. He needed able men for the expedition, true, but he didn't want to strip the home base down to invalids, crackpots, and psychotics. Rudiger stayed. Two of his

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fellow fishermen went on the list. So did Sid Hutchett and Arny Jean-Claude.

Barrett thought about putting Don Latimer in the group. Latimer was coming to be something of a borderline mental case, but he was rational enough except when he lapsed into his psionic meditations, and he'd pull his own weight on the expedition. On the other hand, Latimer was Lew Hahn's roommate, and Barrett wanted Latimer around to observe Hahn at close range. He toyed with the idea of sending both of them out, but nixed it. Hahn was still an unknown quantity. It was too risky to let him go with the Inland Sea party this year. Probably he'd be in next spring's group, though.

Finally Barrett had his dozen men chosen. He chalked their names on the slate in front of the mess hall and found Charley Norton at breakfast to tell him he was in charge.

It felt strange to know that he'd have to stay home while the others went. It was an admission that he was beginning to abdicate after running this place so long. A crippled old man was what he was, whether he liked to admit it to himself or not, and that was something he'd have to come to terms with soon.

In the afternoon, the men of the Inland Sea expedition gathered to select their gear and plan their route. Barrett kept away from the meeting. This was Charley Norton's show, now. He'd made eight or ten trips, and he knew what to do. Barrett didn't want to interfere.

But some masochistic compulsion in him drove him to take a trek of his own. If he couldn't see the western waters this year, the least he could do was pay a visit to the Atlantic, in his own backyard. Barrett stopped off in the infirmary and, finding Quesada elsewhere, helped himself to a tube of neural depressant. He scrambled along the eastern trail until he was a few hundred yards from the main building, dropped his trousers and quickly gave each thigh a jolt of the drug, first the good leg, then the gimpy one. That would numb the muscles just enough so that he'd be able to take an extended hike without feeling the fire of the fatigue in his protesting joints. He'd pay for it, he knew, eight hours from now, when the depressant wore off and the full impact of his exertion hit him like a million daggers. But he was willing to accept that price.

The road to the sea was a long, lonely one. Hawksbill Station was perched on the eastern rim of the geosyncline, more than eight hundred feet above sea lev-

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el. During the first half dozen years, the men of the Station had reached the ocean by a suicidal route across sheer rock faces, but Barrett had incited a ten-year project to carve a path. Now wide steps descended to the sea. Chopping them out of the rock had kept a lot of men busy for a long time, too busy to worry or to slip into insanity. Barrett regretted that he couldn't conceive some comparable works project to occupy them nowadays.

The steps formed a succession of shallow platforms that switchbacked to the edge of the water. Even for a healthy man it was still a strenuous walk. For Barrett in his present condition it was an ordeal. It took him two hours to descend a distance that normally could be traversed in a quarter of that time. When he reached the bottom, he sank down exhaustedly on a flat rock, licked by the waves, and dropped his crutch. The fingers of his left hand were cramped and gnarled from gripping the crutch, and his entire body was bathed in sweat.

The water looked gray and somehow oily. Barrett could not explain the prevailing colorlessness of the late Cambrian world, with its somber sky and somber land and somber sea, but his heart quietly ached for a glimpse of green vegetation again. He missed chlorophyll. The dark wavelets lapped against his rock, pushing a mass of floating black seaweed back and forth. The sea stretched to infinity. He didn't have the faintest idea how much of Europe, if any, was above water in this epoch.

At the best of times most of the planet was submerged; here, only a few hundred million years after the white-hot rocks of the land had pushed into view, it was likely that all that was above water on Earth was a strip of territory here and there. Had the Himalayas been born yet? The Rockies? The Andes? He knew the approximate outlines of late Cambrian North America, but the rest was a mystery. Blanks in knowledge were not easy to fill when the only link with Up Front was by one-way transport; Hawksbill Station had to rely on the random assortment of reading matter that came back in time, and it was furiously frustrating to lack information that any college geology text could supply.

As he watched, a big trilobite unexpectedly came scuttering up out of the water. It was the spike-tailed kind, about a yard long, with an eggplant-purple shell and a bristling arrangement of slender spines along the

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margins. There seemed to be a lot of legs underneath. The trilobite crawled up on the shore — no sand, no beach, just a shelf of rock — and advanced until it was eight or ten feet from the waves.

Good for you, Barrett thought. Maybe you're the first one who ever came out on land to see what it was like. The pioneer. The trailblazer.

It occurred to him that this adventurous trilobite might well be the ancestor of all the land-dwelling creatures of the eons to come. It was biological nonsense, but Barrett's weary mind conjured a picture of an evolutionary procession, with fish and amphibians and reptiles and mamals and man all stemming in unbroken sequence from this grotesque armored thing that moved in uncertain circles near his feet.

And if I were to step on you, he thought?

A quick motion — the sound of crunching chitin — the wild scrabbling of a host of little legs —

And the whole chain of life snapped in its first link. Evolution undone. No land creatures ever developed. With the descent of that heavy foot all the future would change, and there would never have been any Hawksbill Station, no human race, no James Edward Barrett. In an instant he would have both revenge on those who had condemned him to live out his days in this place and release from his sentence.

He did nothing. The trilobite completed its slow perambulation of the shoreline rocks and scuttered back into the sea unharmed.

The soft voice of Don Latimer said, "I saw you sitting down here, Jim. Do you mind if I join you?"

Barrett swung around, momentarily surprised. Latimer had come down from his hilltop hut so quietly that Barrett hadn't heard a thing. He recovered and grinned and beckoned Latimer to an adjoining rock.

"You fishing?" Latimer asked.

"Just sitting. An old man sunning himself."

"You took a hike like that just to sun yourself?" Latimer laughed. "Come off it. You're trying to get away from it all, and you probably wish I hadn't disturbed you."

"That's not so. Stay here. How's your new roommate getting along?"

"It's been strange," said Latimer. "That's one reason I came down here to talk to you." He leaned forward and peered searchingly into Barrett's eyes. "Jim, tell me: do you think I'm a madman?"

"Why should I?"

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"The esping business. My attempt to break through to another realm of consciousness. I know you're tough-minded and skeptical. You probably think it's all a lot of nonsense."

Barrett shrugged and said, "If you want the blunt truth, I do. I don't have the remotest belief that you're going to get us anywhere, Don. I think it's a complete waste of time and energy for you to sit there for hours harnessing your psionic powers, or whatever it is you do. But no, I don't think you're crazy. I think you're entitled to your obsession and that you're going about a basically futile thing in a reasonably level-headed way. Fair enough?"

"More than fair. I don't ask you to put any credence in my research, but I don't want you to think I'm a total lunatic for trying it. It's important that you regard me as sane, or else what I want to tell you about Hahn won't be valid to you."

"I don't see the connection."

"It's this," said Latimer. "On the basis of one evening's acquaintance, I've formed an opinion about Hahn. It's the kind of an opinion that might be formed by a garden variety paranoid, and if you think I'm nuts you're likely to discount my idea."

"I don't think you're nuts. What's your idea?"

"That he's been spying on us."

Barrett had to work hard to keep from emitting the guffaw that would shatter Latimer's fragile self-esteem. "Spying?" he said casually. "You can't mean that. How can anyone spy here? I mean, how can he report his findings?"

"I don't know," Latimer said. "But he asked me a million questions last night. About you, about Quesada, about some of the sick men. He wanted to know everything."

"The normal curiosity of a new man."

"Jim, he was taking notes. I saw him after he thought I was asleep. He sat up for two hours writing it all down in a little book."

Barrett frowned. "Maybe he's going to write a novel about us."

"I'm serious," Latimer said. "Questions — notes. And he's shifty. Try to get him to talk about himself!"

"I did. I didn't learn much."

"Do you know why he's been sent here?"

"No."

"Neither do I," said Latimer. "Political crimes, he said, but he was vague as hell. He hardly seemed to know what the present government was up to, let alone what his own opinions were toward it. I don't detect any passionate philosophical convictions

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in Mr. Hahn. And you know as well as I do that Hawksbill Station is the refuse heap for revolutionaries and agitators and subversives and all sorts of similar trash, but that we've never had any other kind of prisoner here."

Barrett said coolly, "I agree that Hahn's a puzzle. But who could he be spying for? He's got no way to file a report, if he's a government agent. He's stranded here for keeps, like us."

"Maybe he was sent to keep an eye on us — to make sure we aren't cooking up some way to escape. Maybe he's a volunteer who willingly gave up his twenty-first-century life so he could come among us and thwart anything we might be hatching. Perhaps they're afraid we've invented forward time-travel. Or that we've become a threat to the sequence of the time-lines. Anything. So Hahn comes among us to snoop around and block any dangers before they arrive."

Barrett felt a twinge of alarm. He saw how close to paranoia Latimer was hewing, now. In half a dozen sentences he had journeyed from the rational expression of some justifiable suspicions to the fretful fear that the men from Up Front were going to take steps to choke off the escape route that he was so close to perfecting.

He kept his voice level as he told Latimer, "I don't think you need to worry, Don. Hahn's an odd one, but he's not here to make trouble for us. The fellows Up Front have already made all the trouble for us they ever will."

"Would you keep an eye on him anyway?"

"You know I will. And don't hesitate to let me know if Hahn does anything else out of the ordinary. You're in a better spot to notice than anyone else."

"I'll be watching," Latimer said. "We can't tolerate any spies from Up Front among us." He got to his feet and gave Barrett a pleasant smile. "I'll let you get back to your sunning now, Jim."

Latimer went up the path. Barrett eyed him until he was close to the top, only a faint dot against the stony backdrop. After a long while Barrett seized his crutch and levered himself to his feet. He stood staring down at the surf, dipping the tip of his crutch into the water to send a couple of little crawling things scurrying away. At length he turned and began the long, slow climb back to the Station.

VI

A couple of days passed before Barrett had the chance to draw Lew Hahn aside for a spot

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of political discussion. The Inland Sea party had set out, and in a way that was too bad, for Barrett could have used Charley Norton's services in penetrating Hahn's armor. Norton was the most gifted theorist around, a man could weave a tissue of dialectic from the least promising material. If anyone could find out the depth of Hahn's Marxist commitment, if any, it was Norton.

But Norton was leading the expedition, so Barrett had to do the interrogating himself. His Marxism was a trifle rusty, and he couldn't thread his path through the Leninist, Stalinist, Trotskyite, Khrushchevist, Maoist, Berenkovskyite and Mgumbweist schools with Charley Norton's skills. Yet he knew what questions to ask.

He picked a rainy evening when Hahn seemed to be in a fairly outgoing mood. There had been an hour's entertainment that night, an ingenious computer-composed film that Sid Hutchett had programmed last week. Up Front had been kind enough to ship back a modest computer, and Hutchett had rigged it to do animations by specifying line widths and lengths, shades of gray and progression of raster units. It was a simple but remarkably clever business, and it brightened a dull night.

Afterward, sensing that Hahn was relaxed enough to lower his guard a bit, Barrett said, "Hutchett's a rare one. Did you meet him before he went on the trip?"

"Tall fellow with a sharp nose and no chin?"

"That's the one. A clever boy. He was the top computer man for the Continental Liberation Front until they caught him in '19. He programmed that fake broadcast in which Chancellor Dantell denounced his own regime. Remember?"

"I'm not sure I do." Hahn frowned. "How long ago was this?"

"The broadcast was in 2018. Would that be before your time? Only eleven years ago — "

"I was nineteen then," said Hahn. "I guess I wasn't very politically sophisticated."

"Too busy studying economics, I guess."

Hahn grinned. "That's right. Deep in dismal science."

"And you never heard that broadcast? Or even heard of it?"

"I must have forgotten."

"The biggest hoax of the century," Barrett said, "and you forgot it. You know the Continental Liberation Front, of course."

"Of course." Hahn looked uneasy.

"Which group did you say you were with?"

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"The People's Crusade for Liberty."

"I don't know it. One of the newer groups?"

"Less than five years old. It started in California."

"What's its program?"

"Oh, the usual," Hahn said. "Free elections, representative government, an opening of the security files, restoration of civil liberties."

"And the economic orientation? Pure Marxist or one of the offshoots?"

"Not really any, I guess. We believed in a kind of — well, capitalism with some government restraints."

"A little to the right of state socialism, and a little to the left of *laissez-faire?*" Barrett suggested.

"Something like that."

"But that system was tried and failed, wasn't it? It had its day. It led inevitably to total socialism, which produced the compensating backlash of syndicalist capitalism, and then we got a government that pretended to be libertarian while actually stifling all individual liberties in the name of freedom. So if your group simply wanted to turn the clock back to 1955, say, there couldn't be much to its ideas."

Hahn looked bored. "You've got to understand I wasn't in the top ideological councils."

"Just an economist?"

"That's it. I drew up plans for the conversion to our system."

"Basing your work on the modified liberalism of Ricardo?"

"Well, in a sense."

"And avoiding the tendency to fascism that was found in the thinking of Keynes?"

"You could say so," Hahn said. He stood up, flashing a quick, vague smile. "Look, Jim, I'd love to argue this further with you some other time, but I've really got to go now. Ned Altman talked me into coming around and helping him do a lightning-dance to bring that pile of dirt to life. So if you don't mind — "

Hahn beat a hasty retreat, without looking back.

Barrett was more perplexed than ever. Hahn hadn't been "arguing" anything. He had been carrying on a lame and feeble conversation, letting himself be pushed hither and thither by Barrett's questions. And he had spouted a lot of nonsense. He didn't seem to know Keynes from Ricardo, nor to care about it, which was odd for a self-professed economist. He didn't have a shred of an idea what his own political party stood for. He had so little revolutionary background that he was unaware even of Hutchett's astonishing hoax of eleven years back.

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He seemed phony from top to bottom.

How was it possible that this kid had been deemed worthy of exile to Hawksbill Station, anyhow? Only the top firebrands went there. Sentencing a man to Hawksbill was like sentencing him to death, and it wasn't done lightly. Barrett couldn't imagine why Hahn was here. He seemed genuinely distressed at being exiled, and evidently he had left a beloved wife behind, but nothing else rang true about the man.

Was he — as Latimer suggested — some kind of spy?

Barrett rejected the idea out of hand. He didn't want Latimer's paranoia infecting him. The government wasn't likely to send anyone on a one-way trip to the Late Cambrian just to spy on a bunch of aging revolutionaries who could never make trouble again. But what *was* Hahn doing here, then?

He would bear further watching, Barrett thought.

Barrett took care of some of the watching himself. But he had plenty of assistance. Latimer. Altman. Six or seven others. Latimer had recruited most of the ambulatory psycho cases, the ones who were superficially functional but full of all kinds of fears and credulities.

They were keeping an eye on the new man.

On the fifth day after his arrival, Hahn went out fishing in Rudiger's crew. Barrett stood for a long time on the edge of the geosyncline, watching the little boat bobbing in the surging Atlantic. Rudiger never went far from shore — eight hundred, a thousand yards out — but the water was rough even there. The waves came rolling in with X thousand miles of gathered impact behind them. A continental shelf sloped off at a wide angle, so that even at a substantial distance off shore the water wasn't very deep. Rudiger had taken soundings up to a mile out, and had reported depths no greater than a hundred sixty feet. Nobody had gone past a mile.

It wasn't that they were afraid of falling off the side of the world if they went too far east. It was simply that a mile was a long distance to row in an open boat, using stubby oars made from old packing cases. Up Front hadn't thought to spare an outboard motor for them.

Looking toward the horizon, Barrett had an odd thought. He had been told that the women's equivalent of Hawksbill Station was safely segregated out of reach, a couple of hundred million years up the time-line. But how did he know that? There could be another Station somewhere else in this very year, and

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they'd never know about it. A camp of women, say, living on the far side of the ocean, or even across the Inland Sea.

It wasn't very likely, he knew. With the entire past to pick from, the edgy men Up Front wouldn't take any chance that the two groups of exiles might get together and spawn a tribe of little subversives. They'd take every precaution to put an impenetrable barrier of epochs between them. Yet Barrett thought he could make it sound convincing to the other men. With a little effort he could get them to believe in the existence of several simultaneous Hawksbill Stations scattered on this level of time.

Which could be our salvation, he thought.

The instances of degenerative psychosis were beginning to snowball, now. Too many men had been here too long, and one crackup was starting to feed the next, in this blank lifeless world where humans were never meant to live. The men needed projects to keep them going. They were starting to slip off into harebrained projects, like Altman's Frankenstein girlfriend and Latimer's psi pursuit.

Suppose, Barrett thought, I could get them steamed up about reaching the other continents?

A round-the-world expedition. Maybe they could build some kind of big ship. That would keep a lot of men busy for a long time. And they'd need navagational equipment — compasses, sextants, chronometers, whatnot. Somebody would have to design an improvised radio, too. It was the kind of project that might take thirty or forty years. A focus for our energies, Barrett thought. Of course, I won't live to see the ship set sail. But even so, it's a way of staving off collapse. We've built our staircase to the sea. Now we need something bigger to do. Idle hands make for idle minds . . . sick minds . . .

He liked the idea he had hatched. For several weeks now Barrett had been worrying about the deteriorating state of affairs in the Station, and looking for some way to cope with it. Now he thought he had his way.

Turning, he saw Latimer and Altman standing behind him.

"How long have you been there?" he asked.

"Two minutes," said Latimer. "We brought you something to look at."

Altman nodded vigorously. "You ought to read it. We brought it for you to read."

"What is it?"

Latimer handed over a folded sheaf of papers. "I found this tucked away in Hahn's bunk af-

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ter he went out with Rudiger. I know I'm not supposed to be invading his privacy, but I had to have a look at what he's been writing. There it is. He's a spy, all right."

Barrett glanced at the papers in his hand. "I'll read it a little later. What is it about?"

"It's a description of the Station, and a profile of most of the men in it," said Latimer. He smiled frostily. "Hahn's private opinion of me is that I've gone mad. His private opinion of you is a little more flattering, but not much."

Altman said, "He's also been hanging around the Hammer."

"*What?*"

"I saw him going there late last night. He went into the building. I followed him. He was looking at the Hammer."

"Why didn't you tell me that right away?" Barrett snapped.

"I wasn't sure it was important," Altman said. "I had to talk it over with Don first. And I couldn't do that until Hahn had gone out fishing."

Sweat burst out on Barrett's face. "Listen, Ned, if you ever catch Hahn going near the time-travel equipment again, you let me know in a hurry. Without consulting Don or anyone else. Clear?"

"Clear," said Altman. He giggled. "You know what I think? They've decided to exterminate us Up Front. Hahn's been sent here to check us out as a suicide volunteer. Then they're going to send a bomb through the Hammer and blow the Station up. We ought to wreck the Hammer and Anvil before they get a chance."

"But why would they send a suicide volunteer?" Latimer asked. "Unless they've got some way to rescue their spy — "

"In any case we shouldn't take any chance," Altman argued. "Wreck the Hammer. Make it impossible for them to bomb us from Up Front."

"That might be a good idea. But — "

"Shut up, both of you," Barrett growled. "Let me look at these papers."

He walked a few steps away from them and sat down on a shelf of rock. He began to read.

VII

Hahn had a cramped, crabbed handwriting that packed a maximum of information into a minimum of space, as though he regarded it as a mortal sin to waste paper. Fair enough. Paper was a scarce commodity here, and evidently Hahn had brought these sheets with him from Up Front. His script was clear, though. So were his opinions. Painfully so.

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He had written an analysis of conditions at Hawksbill Station, setting forth in about five thousand words everything that Barrett knew was going sour here. He had neatly ticked off the men as aging revolutionaries in whom the old fervor had turned rancid. He listed the ones who were certifiably psycho, and the ones who were on the edge, and the ones who were hanging on, like Quesada and Norton and Rudiger. Barrett was interested to see that Hahn rated even those three as suffering from severe strain and likely to fly apart at any moment. To him, Quesada and Norton and Rudiger seemed just about as stable as when they had first dropped onto the Anvil of Hawksbill Station, but that was possibly the distorting effect of his own blurred perceptions. To an outsider like Hahn, the view was different and perhaps more accurate.

Barrett forced himself not to skip ahead to Hahn's evaluation of him.

He wasn't pleased when he came to it. "Barrett," Hahn had written, "is like a mighty beam that's been gnawed from within by termites. He looks solid, but one good push would break him apart. A recent injury to his foot has evidently had a bad effect on him. The other men say he used to be physically vigorous and derived much of his authority from his size and strength. Now he can hardly walk. But I feel the trouble with him is inherent in the life of Hawksbill Station and doesn't have much to do with his lameness. He's been cut off from normal human drives for too long. The exercise of power here has provided the illusion of stability for him, but it's power in a vacuum, and things have happened within Barrett of which he's totally unaware. He's in bad need of therapy. He may be beyond help."

Barrett read that several times. *Gnawed from within by termites . . . one good push . . . things have happened within him . . . bad need of therapy . . . beyond help . . .*

He was less angered than he thought he should have been. Hahn was entitled to his views. Barrett finally stopped rereading his profile and pushed his way to the last page of Hahn's essay. It ended with the words, "Therefore I recommend prompt termination of the Hawksbill Station penal colony and, where possible, the therapeutic rehabilitation of its inmates."

What the hell was this?

It sounded like the report of a parole commisioner! But there was no parole from Hawksbill

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Station. That final sentence let all the viability of what had gone before bleed away. Hahn was pretending to be composing a report to the government Up Front, obviously. But a wall two billion years thick made filing of that report impossible. So Hahn was suffering from delusions, just like Altman and Valdosto and the others. In his fevered mind he believed he could send messages Up Front, pompus documents delineating the flaws and foibles of his fellow prisoners.

That raised a chilling prospect. Hahn might be crazy, but he hadn't been in the Station long enough to have gone crazy here. He must have brought his insanity with him.

What if they had stopped using Hawksbill Station as a camp for political prisoners, Barrett asked himself, and were starting to use it as an insane asylum?

A cascade of psychos descending on them. Men who had gone honorably buggy under the stress of confinement would have to make room for ordinary Bedlamites. Barrett shivered. He folded up Hahn's papers and handed them to Latimer, who was sitting a few yards away, watching him intently.

"What did you think of that?" Latimer asked.

"I think it's hard to evaluate. But possibly friend Hahn is emotionally disturbed. Put this stuff back exactly where you got it, Don. And don't give Hahn the faintest inkling that you've read or removed it."

"Right."

"And come to me whenever you think there's something I ought to know about him," Barrett said. "He may be a very sick boy. He may need all the help we can give."

The fishing expedition returned in early afternoon. Barrett saw that the dingy was overflowing with the haul, and Hahn, coming into the camp with his arms full of gaffed trilobites looked sunburned and pleased with his outing. Barrett came over to inspect the catch. Rudiger was in an effusive mood and held up a bright red crustacean that might have been the great-great-grandfather of all boiled lobsters, except that it had no front claws and a wicked-looking triple spike where a tail should have been. It was about two feet long, and ugly.

"A new species!" Rudiger crowed. "There's nothing like this in any museum. I wish I could put it where it would be found. Some mountaintop, maybe."

"If it could be found, it *would* have been found," Barrett reminded him. "Some paleontolo-

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gist of the twentieth century would have dug it out. So forget it, Mel."

Hahn said, "I've been wondering about that point. How is it nobody Up Front ever dug up the fossil remains of Hawksbill Station? Aren't they worried that one of the early fossil-hunters will find it in the Cambrian strata and raise a fuss?"

Barrett shook his head. "For one thing, no paleontologist from the beginning of the science to the founding of the Station in 2005 ever *did* dig up Hawksbill. That's a matter of record, so there was nothing to worry about. If it came to light after 2005, why, everyone would know what it was. No paradox there."

"Besides," said Rudiger sadly, "in another two billion years this whole strip of rock will be on the floor of the Atlantic, with a couple of miles of sediment over it. There's not a chance we'll be found. Or that anyone Up Front will ever see this guy I caught today. Not that I give a damn. I've seen him. I'll dissect him. Their loss."

"But you regret the fact that science will never know of this species," Hahn said.

"Sure I do. But is it my fault? Science does know of this species. Me. I'm science. I'm the leading paleontologist of this epoch. Can I help it if I can't publish my discoveries in the professional journals?" He scowled and walked away, carrying the big red crustacean.

Hahn and Barrett looked at each other. They smiled, in a natural mutual response to Rudiger's grumbled outburst. Then Barrett's smile faded.

termites . . . one good push . . . therapy . . .

"Something wrong?" Hahn asked.

"Why?"

"You looked so bleak all of a sudden."

"My foot gave me a twinge," Barrett said. "It does that, you know. Here. I'll give you a hand carrying those things. We'll have fresh trilobite cocktail tonight."

VIII

A little before midnight, Barrett was awakened by footsteps outside his hut. As he sat up, groping for the luminescence switch, Ned Altman came blundering through the door. Barrett blinked at him.

"What's the matter?"

"Hahn!" Altman rasped. "He's fooling around with the Hammer again. We just saw him go into the building."

Barrett shed his sleepiness like a seal bursting out of water. Ignoring the insistent throb in his leg, he pulled himself from his

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bed and grabbed some clothing. He was more apprehensive than he wanted Altman to see. If Hahn, fooling around with the temporal mechanisms, accidentally smashed the Hammer, they might never get replacement equipment from Up Front. Which would mean that all future shipments of supplies — if there were any — would come as random shoots that might land in any old year. What business did Hahn have with the machine, anyway?

Altman said, "Latimer's up there keeping an eye on him. He got suspicious when Hahn didn't come back to the hut, and he got me, and we went looking for him. And there he was, sniffing around the Hammer."

"Doing what?"

"I don't know. As soon as we saw him go in, I came down here to get you. Don's watching."

Barrett stumped his way out of the hut and did his best to run toward the main building. Pain shot like trails of hot acid up the lower half of his body. The crutch dug mercilessly into his left armpit as he leaned all his weight into it. His crippled foot, swinging freely, burned with a cold glow. His right leg, which was carrying most of the burden, creaked and popped. Altman ran breathlessly alongside him. The Station was silent at this hour.

As they passed Quesada's hut, Barrett considered waking the medic and taking him along. He decided against it. Whatever trouble Hahn might be up to, Barrett felt he could handle it himself. There was some strength left in the old gnawed beam.

Latimer stood at the entrance to the main dome. He was right on the edge of panic, or perhaps over the edge. He seemed to be gibbering with fear and shock. Barrett had never seen a man gibber before.

He clamped a big paw on Latimer's thin shoulder and said harshly, "Where is he? Where's Hahn?"

"He — disappered."

"What do you mean? Where did he go?"

Latimer moaned. His face was fishbelly white. "He got onto the Anvil," Latimer blurted. "The light came on — the glow. And then Hahn disappeared!"

"No," Barrett said. "It isn't possible. You must be mistaken."

"I saw him go!"

"He's hiding somewhere in the building," Barrett insisted. "Close that door! Search for him!"

Altman said, "He probably did disappear, Jim. If Don says he disappeared — "

"He climbed right on the Anvil. Then everything turned red, and he was gone."

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Barrett clenched his fists. There was a white-hot blaze just behind his forehead that almost made him forget about his foot. He saw his mistake now. He had depended for his espionage on two men who were patently and unmistakably insane, and that had been itself a not very sane thing to do. A man is known by his choice of lieutenants. Well, he had relied on Altman and Latimer, and now they were giving him the sort of information that such spies could be counted on to supply.

"You're hallucinating," he told Latimer curtly. "Ned, go wake Quesada and get him here right away. You, Don, you stand here by the entrance, and if Hahn shows up I want you to scream at the top of your lungs. I'm going to search the building for him."

"Wait," Latimer said. He seemed to be in control of himself again. "Jim, do you remember when I asked you if you thought I was crazy? You said you didn't." You trusted me. Well, don't stop trusting me now. I tell you I'm not hallucinating. I saw Hahn disappear. I can't explain it, but I'm rational enough to know what I saw."

In a milder tone Barrett said, "All right. Maybe so. Stay by the door, anyway. I'll run a quick check."

He started to make the circuit of the dome, beginning with the room where the Hammer was located. Everything seemed to be in order there. No Hawksbill Field glow was in evidence, and nothing had been disturbed. The room had no closets or cupboards in which Hahn could be hiding. When he had inspected it thoroughly, Barrett moved on, looking into the infirmary, the mess hall, the kitchen, the recreation room. He looked high and low. No Hahn. Of course, there were plenty of places in those rooms where Hahn might have secreted himself, but Barrett doubted that he was there. So it had all been some feverish fantasy of Latimer's, then. He completed the route and found himself back at the main entrance. Latimer still stood guard there. He had been joined by a sleepy Quesada. Altman, pale and shaky-looking, was just outside the door.

"What's happening?" Quesada asked.

"I'm not sure," said Barrett. "Don and Ned had the idea they saw Lew Hahn fooling around with the time equipment. I've checked the building, and he's not here, so maybe they made a little mistake. I suggest you take them both into the infirmary and give them a shot of something to settle their nerves, and we'll all try to get back to sleep."

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Latimer said, "I tell you, I saw —"

"Shut up!" Altman broke in. "Listen! What's that noise?"

Barrett listened. The sound was clear and loud: the hissing whine of ionization. It was the sound produced by a functioning Hawksbill Field. Suddenly there were goosepimples on his flesh. In a low voice he said, "The field's on. We're probably getting some supplies."

"At this hour?" said Latimer.

"We don't know what time it is Up Front. All of you stay here. I'll check the Hammer."

"Perhaps I ought to go with you," Quesada suggested mildly.

"*Stay here!*" Barrett thundered. He paused, embarrassed at his own explosive show of wrath. "It only takes one of us. I'll be right back."

Without waiting for further dissent, he pivoted and limped down the hall to the Hammer room. He shouldered the door open and looked in. There was no need for him to switch on the light. The red glow of the Hawksbill Field illuminated everything.

Barrett stationed himself just within the door. Hardly daring to breathe, he stared fixedly at the Hammer, watching as the glow deepened through various shades of pink toward crimson, and then spread until it enfolded the waiting Anvil beneath it.

Then came the implosive thunderclap, and Lew Hahn dropped out of nowhere and lay for a moment in temporal shock on the broad plate of the Anvil.

IX

In the darkness, Hahn did not notice Barrett at first. He sat up slowly, shaking off the stunning effects of a trip through time. After a few seconds he pushed himself toward the lip of the Anvil and let his legs dangle over it. He swung them to get the circulation going. He took a series of deep breaths. Finally he slipped to the floor. The glow of the field had gone out in the moment of his arrival, and so he moved warily, as though not wanting to bump into anything.

Abruptly Barrett switched on the light and said, "What have you been up to, Hahn?"

The younger man recoiled as though he had been jabbed in the gut. He gasped, hopped backward a few steps, and flung up both hands in a defensive gesture.

"Answer me," Barrett said.

Hahn regained his equilibrium. He shot a quick glance past Barrett's bulky form toward the hallway and said, "Let me go, will you? I can't explain now."

"You'd better explain now."

"It's easier for everyone if I don't," said Hahn. "Let me pass."

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Barrett continued to block the door. "I want to know where you've been. What have you been doing with the Hammer?"

"Nothing. Just studying it."

"You weren't in this room a minute ago. Then you appeared. Where'd you come from, Hahn?"

"You're mistaken. I was standing right behind the Hammer. I didn't — "

"I saw you drop down on the Anvil. You took a time trip, didn't you?"

"No."

"Don't lie to me! You've got some way of going forward in time, isn't that so? You've been spying on us, and you just went somewhere to file your report — somewhen — and now you're back."

Hahn's forehead was glistening. He said, "I warn you, don't ask too many questions. You'll know everything in due time. This isn't the time. Please, now. Let me pass."

"I want answers first," Barrett said. He realized that he was trembling. He already knew the answers, and they were answers that shook him to the core of his soul. He knew where Hahn had been.

Hahn said nothing. He took a few hesitant steps toward Barrett, who did not move. He seemed to be gathering momentum for a rush at the doorway.

Barrett said, "You aren't getting out of here until you tell me what I want to know."

Hahn charged.

Barrett planted himself squarely, crutch braced against the doorframe, his good leg flat on the floor, and waited for the younger man to reach him. He figured he outweighed Hahn by eighty pounds. That might be enough to balance the fact that he was spotting Hahn thirty years and one leg. They came together, and Barrett drove his hands down onto Hahn's shoulder's, trying to hold him, to force him back into the room.

Hahn gave an inch or two. He looked up at Barrett without speaking and pushed forward again.

"Don't — don't — " Barrett grunted. "I won't let you — "

"I don't want to do this," Hahn said.

He pushed again. Barrett felt himself buckling under the impact. He dug his hands as hard as he could into Hahn's shoulders and tried to shove the other man backward into the room, but Hahn held firm, and all of Barrett's energy was converted into a thrust rebounding on himself. He lost control of his crutch, and it slithered out from under his arm. For one agonizing moment Barrett's full weight rested on

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the crushed uselessness of his left foot, and then, as though his limbs were melting away beneath him, he began to sink toward the floor. He landed with a reverberating crash.

Quesada, Altman and Latimer came rushing in. Barrett writhed in pain on the floor. Hahn stood over him, looking unhappy, his hands locked together.

"I'm sorry," he said. "You shouldn't have tried to muscle me like that."

Barrett glowered at him. "You were traveling in time, weren't you? You can answer me now!"

"Yes," Hahn said at last. "I went Up Front."

An hour later, after Quesada had pumped him with enough neural depressants to keep him from jumping out of his skin, Barrett got the full story. Hahn hadn't wanted to reveal it so soon, but he had changed his mind after his little scuffle.

It was all very simple. Time travel now worked in both directions. The glib, impressive noises about the flow of entropy had turned out to be just noises.

"How long has this been known?" Barrett asked.

"At least five years. We aren't sure yet exactly when the breakthrough came. After we're finshed going through all the suppressed records of the former government—"

"The former government?"

Hahn nodded. "The revolution came in January. Not really a violent one, either. The syndicalists just mildewed from within, and when they got the first push they fell over."

"Was it mildew?" Barrett asked, coloring. "Or termites? Keep your metaphors straight."

Hahn glanced away. "Anyway, the government fell. We've got a provisional liberal regime in office now. Don't ask me much about it. I'm not a political theorist. I'm not even an economist. You guessed as much."

"What are you, then?"

"A policeman," Hahn said. "Part of the commission that's investigating the prison system of the former government. Including this prison."

Barrett looked at Quesada, then at Hahn. Thoughts were streaming turbulently through him, and he could not remember when he had last been so overwhelmed by events. He had to work hard to keep from breaking into the shakes again. His voice quavered a little as he said, "You came back to observe Hawksbill Station, right? And you went Up Front tonight to tell them what you saw here. You think we're a pretty sad bunch, eh?"

"You've all been under heavy

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stress here," Hahn said. "Considering the circumstances of your imprisonment — "

Quesada broke in. "If there's a liberal government in power now and it's possible to travel both ways in time, then am I right in assuming that the Hawksbill prisoners are going to be sent Up Front?"

"Of course," said Hahn. "It'll be done as soon as possible. That's been the whole purpose of my reconnaissance mission. To find out if you people were still alive, first, and then to see what shape you're in, how badly in need of treatment you are. You'll be given every available benefit of modern therapy, naturally. No expense spared — "

Barrett scarcely paid attention to Hahn's words. He had been fearing something like this all night, ever since Altman had told him Hahn was monkeying with the Hammer, but he had never fully allowed himself to believe that it could really be possible.

He saw his kingdom crumbling.

He saw himself returned to a world he could not begin to comprehend — a lame Rip Van Winkle, coming back after twenty years.

He saw himself leaving a place that had become his home.

Barrett said tiredly, "You know, some of the men aren't going to be able to adapt to the shock of freedom. It might just kill them to be dumped into the real world again. I mean the advanced psychos — Valdosto, and such."

"Yes," Hahn said. "I've mentioned them in my report."

"It'll be necessary to get them ready for a return in gradual stages. It might take several years to condition them to the idea. It might even take longer than that."

"I'm no therapist," said Hahn. "Whatever the doctors think is right for them is what'll be done. Maybe it will be necessary to keep them here. I can see where it would be pretty potent to send them back, after they've spent all these years believing there's no return."

"More than that," said Barrett. "There's a lot of work that can be done here. Scientific work. Exploration. I don't think Hawksbill Station ought to be closed down."

"No one said it would be. We have every intention of keeping it going, but not as a prison."

"Good," Barrett said. He fumbled for his crutch, found it and got heavily to his feet. Quesada moved toward him as though to steady him, but Barrett shook him off. "Let's go outside," he said.

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They left the building. A gray mist had come in over the Station, and a fine drizzle had begun to fall. Barrett looked around at the scattering of huts. At the ocean, dimly visible to the east in the faint moonlight. He thought of Charley Norton and the party that had gone on the annual expedition to the Inland Sea. That bunch was going to be in for a real surprise, when they got back here in a few weeks and discovered that everybody was free to go home.

Very strangely, Barrett felt a sudden pressure forming around his eyelids, as of tears trying to force their way out into the open.

He surveyed his kingdom from the top of the hill, taking a long, slow look.

Then he turned to Hahn and Quesada. In a low voice he said, "Have you followed what I've been trying to tell you? Someone's got to stay here and ease the transition for the sick men who won't be able to stand the shock of return. Someone's got to keep the base running. Someone's got to explain to the new men who'll be coming back here, the scientists."

"Naturally," Hahn said.

"The one who does that — the one who stays behind — I think it ought to be someone who knows the Station well, someone who's fit to return Up Front, but who's willing to make the sacrifice and stay. Do you follow me? A volunteer." They were smiling at him now. Barrett wondered if there might not be something patronizing about those smiles. He wondered if he might not be a little too transparent. To hell with both of them, he thought. He sucked the Cambrian air into his lungs until his chest swelled grandly.

"I'm offering to stay," Barrett said in a loud tone. He glared at them to keep them from objecting. But they wouldn't dare object, he knew. In Hawksbill Station, he was the king. And he meant to keep it that way. "I'll be the volunteer," he said. "I'll be the one who stays."

He looked out over his kingdom from the top of the hill.

—ROBERT SILVERBERG

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ANGEL, DARK ANGEL

by ROGER ZELAZNY

Somewhere the sun is shining,
and life goes on in the galaxy
— because of these things . . .

He entered the kiosk and escalated down to the deck that stood beside the rumbling strip. He was fifty-five years of age and he bore a briefcase in his right hand.

As he crossed toward the conveyor belt, a dozen heads turned in his direction because of the flash of light which occurred immediately before him.

For one bright instant, a dark figure stood in his path.

Then there came the *crack* of imploding air, as the figure vanished and the man fell to the deck.

Later that day, the death record read, "Natural causes."

Which was true. Quite, quite true.

* * *

It slithered along the moist tunnel, heading toward the river.

It knew that its life had ended the moment that the blaze occurred; and the facets of its eyes held sixty-four images of the tall, leather-masked figure, garbed all in black, with its hard, dark hand upraised.

The hand extended toward it, offering that which it could not refuse.

The gift was thunder and pain, and the medical record prepared later that day said, "Natural causes."

* * *

Putting down his champagne glass, he unfastened her negligee and pushed it back over her

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shoulders. His hands molded her, described her sex, drew her down onto the bed. She sighed as he raised himself onto an elbow and touched her lips.

She felt him stiffen, in the glare that came from the corner of the suite. She screamed within the thunderclap that followed, having glimpsed the Angel of Death for a single, dark moment as she felt her lover stop his loving, forever.

This, too, was the result of natural causes.

The man called Stain was in his greenhouse, where he had spent some part of almost every day for the past two years, plucking dead leaves and taking cuttings.

He was slightly under six feet in height, and his eyes were iodine-dark within his sharp-cornered, sunbaked face beneath black hair salted lightly at the temples.

His left shoulder brushed against an earthenware pot on the shelf at his back, and he felt its movement and departure.

Turning, he caught it at waist-level and replaced it on the shelf.

He began repotting a geranium, and then the instrument strapped to his left wrist buzzed and he pressed a button on its side and said, "Yes?"

"Stain," said the voice, which could have been coming from the red flowers in his hand, "do you love the human races and all other living things within the universe?"

"Of course," he replied, recognizing the crackling sibilance that was the voice of Morgenguard.

"Then please prepare yourself for a journey of some duration and report to your old cubicle in Shadowhall."

"But I am retired, and there must be many others whose speed now exceeds my own."

"Your last medical report shows that your speed is undiminished. You are still one of the ten best. You were retired at the proper age because it is your right to enjoy the rest of your days as you see fit. You are not ordered to do the thing I now say. You are requested to do it. So you may refuse if you see fit. Should you accept, however, you will be compensated, and you will have served the things you profess to love."

"What would you have of me?"

"Come not in uniform, but in civil garb. Bring with you your gauntlets and your daily requirements in all things, save nourishment, for a period of approximately two weeks."

"Very well. I will attend directly."

The communication ended, and he finished potting the geranium

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and returned to his quarters.

To his knowledge, none such as himself had ever been recalled from retirement, nor was his knowledge inaccurate.

Her name is Galatea, and she has red hair and stands to slightly over five and a half feet in height. Her eyes are green and her complexion pale, and men call her lovely but generally avoid her company. She lives in a big, old house which she has remodeled, on the outskirts of Cyborg, an ancient city on Ankus in the Ceti System. She keeps to herself and runs up large bills with the Cyborg Power Co.

She lives alone, save for mechanical servants. She favors dark colors in her garb and her surroundings. She occasionally plays tennis or else fences at the local sports center. She always wins. She orders large quantities of chemicals from local wholesalers. Men who have dated her say that she is stupid, brilliant, oversexed, a prude, fascinated with her deathwish, full of *joie de vivre,* an alcoholic, a teetotaler and a wonderful dancer. She has had many dates/few friends/no suitors, and her lovers be unknown. It is suggested that she maintains a laboratory and perhaps engages in unknown researches.

* * *

"We do not know the answer," said Simule. "There is no defense against him, save here. I cannot remain here if I am to serve my function. Therefore, I must leave soon, and secretly."

"Wait," she said. "You are not yet ready to survive on your own. Another month, perhaps . . ."

"Too long, too long, we fear," Simule replied.

"Do you doubt my power to protect you?"

Simule paused, as if to consider, then, "No. You can save this body, but the question, 'Is it worth it?' comes forth. Is it worth it? Preserve yourself, lady. We love you. There remains yet more that you may do."

"We shall see," she said. "But for now, you remain."

She replaced him, upon the reading stand in her library, and she left him there with *Lear.*

His name was Stain, and he came to her door one day and announced himself, saying, "Stain, of Iceborg."

After a time, the door let him in.

She appeared and asked, "Yes?"

"My name is Stain," he replied, "and I have heard that you play tennis, and are very good. I am looking for a partner in the Cyborg Open Mixed Doubles. I am good. Will you play with me?"

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"How good?" she asked him.

"They don't come much better."

"Catch," she said, and picked up a marble figurine from off an inlaid table and hurled it toward him.

He caught it, fumbling, and set it on the ledge at his side.

"Your reflexes are good," she replied. "Very well, I'll play with you."

"Will you have dinner with me tonight?"

"Why?"

"Why not? I don't know anyone here."

"All right. Eight o'clock."

"I'll pick you up then."

"Till then."

"Till then."

He turned, and headed back toward the town and his hotel.

Of course, they took the tournament. They won hands down. And Stain and Galatea danced that night and drank champagne, and she asked him as he held her, both of them all in black, "What do you do, Stain?"

"Nothing but enjoy myself," he said. "I'm retired."

"In your thirties?"

"Thirty-two."

She sighed and softened within his arms.

"What do *you* do?" he asked.

"I, too, am retired. I enjoy my hobbies. I do as I would."

"What does that come to?"

"Whatever I please."

"I've brought you a Hylagian orchid to wear in your hair, or anywhere else you may choose. I'll give it to you when we return to the table."

"They're very expensive," she said.

"Not so if you raise them yourself."

"And you do?"

"*My* hobby," he replied.

At their table, they finished their champagne and smoked and she studied the flower and her companion. The club was done all in silver and black, and the music was soft — and as the dancers seated themselves it lost all semblance of a theme. Her smile was the candle of their table, and he ordered them a dessert and liqueurs to accompany it, and she said, "Your poise defies description."

"Thank you, but yours is superior."

"What did you do, before you retired?"

"I was a paymaster. What of yourself?"

"I dealt in accounts receivable, for a large concern."

"Then we have something else almost in common."

"So it would seem. What will you do now?"

"I'd like to continue seeing you, for so long as I am in town."

"How long might that be?"

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"For so long as I might wish, or you desire."

"Then let us finish our sherbet; and since you wish me to have the trophy, we will take it home."

He brushed the back of her hand, lightly, and for an instant their eyes met, and a spark that might have been electric leapt between them and they smiled at precisely the same instant.

After a time, he took her home.

The bat-thing quivered and dipped, on the way to the council of its people.

As it passed by a mountaintop, there came a flash of light. Though its speed was virtually inconceivable and its movement unpredictable, it knew that it would fall in an instant; and it did, as the thunder roared above it.

* * *

He held her very closely and their lips met. They stood in the foyer of her big old remodeled house on the outskirts of Cyborg City on Ankus, of the Ceti System, and one of her mechanical servants had taken their cloaks and another the double-handled golden tennis trophy, and the front door had closed behind them and the night lights had come on dim as they had entered.

"You'll stay awhile," she said.

"Fine."

And she led him into a long, sunken living room filled with soft furniture, with a fresco upon one wall. They faced it as he seated himself on the green divan, and he stared at the wall as he lit two cigarettes and she handed him a final drink and joined him there.

"Lovely," he said.

"You like my fresco?"

"I hadn't noticed it."

"...And you haven't tasted your drink."

"I know."

Her hand came to rest upon his arm, and he put his drink aside and drew her to him once again, just as she put hers to rest.

"You are quite different from most men," she said.

"...And you from most women."

"Is it growing warm in here?"

"Very," he said.

* * *

Somewhere it is raining. Controlled or artificial — somewhere it is always raining, any time you care to think about it. Always remember that, if you can.

A dozen days had passed since the finale of the Cyborg City Mixed Open. Every day Stain and Galatea moved together somewhere. His hand upon her elbow or about her waist, she

~~HAWKBILL STATION~~
ANGEL, DARK ANGEL

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showed him Cyborg City. They laughed often, and the sky was pink and the winds were gentle and in the distance the cliffs of Ankus wore haloes of fog prismatic and crowns of snow and ice.

Then he asked her of the fresco as they sat in her living room.

"It represents the progress of human thought," she said. "That figure — far to the left, contemplating the birds in flight — is Leonardo Da Vinci, deciding that man might do likewise. High at the top and somewhat to the left, the two figures ascending the ziggurat toward the rose are Dante and Virgil, the Classic and the Christian, joined together and departing the Middle Ages of Earth into a new freedom — the place where Leonardo might contemplate. That man off to the right is John Locke. That's the social contract in his hand. That man near the middle — the little man clutching the figure-eight — is Albert Einstein."

"Who is the blinded man far to the left, with the burning city at his back?"

"That is Homer."

"And *that* one?"

"Job, on a heap of rubble."

"Why are they all here?"

"Because they represent that which must never be forgotten."

"I do not understand. I have not forgotten them."

"Yet the final five feet to the right are blank."

"Why?"

"There is nothing to put there. Not in a century has there been anything worth adding. Everything now is planned, prescribed, directed —"

"And no ill comes of it, and the worlds are managed well. Do not tell me how fine were the days of glorious discontent, days through which you never lived yourself. The work done then has not gone to waste. Everything is appreciated, used."

"But what new things have been added?"

"Size, and ease of operation within it. Do not preach to me of progress. Change is not desirable for its own sake, but only if it offers improvement. I could complete your fresco for you —"

"With a gigantic machine guarded by the Angel of Death! I know!"

"You are wrong. It would end with the Garden of Eden."

She laughed.

"Now you know the story of my fresco."

He took her hand. "You may be right," he said. "I don't really know. I was only talking about how things seem to me."

"And *you* may be right," she said. "*I* don't really know... I just feel there should be some-

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thing to counterbalance that wonderfully flexible mechanism which guides us so superbly that we are becoming the vegetables in that garden you would draw me."

"Have you any suggestions?"

"Have you read any of my papers?"

"I'm afraid not. I fool around with my own garden and I play tennis. That's about it."

"I have proposed the thesis that man's intelligence, extruded into the inanimate, has lost all that is human. Could you repair the machine that mixes our drinks, if it ceased to function?"

"Yes."

"Then you are very unusual. Most people would call in a robot which specializes in small appliance repairs."

Stain shrugged.

"Not only have we given up this function of intelligent manipulation — but divorced from us and existing elsewhere, it turns and seeks to suppress what remains of it within ourselves."

"What do you mean?"

"Why has life become a horizontal line, rather than an upward curve? One reason is that men of genius die young."

"This I cannot believe."

"I purposely published my most important papers recently and I was visited by the Angel of Death. This proved it to me."

He smiled.

"You still live, so this could not be so."

She returned his smile, and he lit two cigarettes and said, "On what subjects were the papers?"

"The Preservation of Sensibility."

"An innocuous-seeming subject."

"Perhaps."

"What do you mean 'perhaps'? Perhaps I misunderstand you."

"It would seem that you do. Sensibility is a form of esthetic consciousness cultivated by intelligence. This is lacking today and I proposed a method whereby it might be preserved. The fruits of my work were then threatened."

"And what may these be?"

She tilted her head slightly, studied his face, then, "Come with me, and I will show you," she said, and she rose and led him into her library. As he followed her, he removed from an inner pocket his black gauntlets and drew them onto his hands. Then he jammed his hands into his side pockets to cover them and entered the room at her back.

"Simule," she called out, and the tiny creature that sat before a reading machine upon her desk leapt into her extended hand, ran up her right arm and sat upon her shoulder.

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"What is it?" he questioned.

"The answer," she said. "Pure, mechanistic intelligence can be countered by an infinitely mobile and easily concealed organic preserver of sensibility. This is Simule. He and others like him came to life in my laboratory."

"Others?"

"There are many, upon many worlds already. They share a mass mind. They learn constantly. They have no personal ambition. They wish only to learn and to instruct any who wish to learn from them. They do not fear the death of their bodies, for they continue to exist thereafter as a part of the mind they all share. They — or it — are — or is — lacking in any other personal passion. The Simule could never represent a threat to the human races. I know this, for I am their mother. Take Simule into your hand, consider him, ask him anything. Simule, this is Stain; Stain, this is Simule."

Stain extended his right hand, and the Simule leaped into it. Stain studied the tiny, six-legged creature, with its disquietingly near-human face. Near. Yet not quite. It was unmarked by the physical conversions of those abstract passion-producers men call good and evil, which show in some form upon every human countenance. Its ears were large, doubtless for purposes of eavesdropping, and its two antennae quivered upon its hairless head as it raised a frail limb as if to shake hands. An eternal smile played upon its lips, and Stain smiled back. "Hello," he said, and the Simule replied in a soft, but surprisingly rich voice, "The pleasure is mine, sir."

Stain said, "What is so rare as a day in June?" and the Simule replied, "Why, the lady Galatea, of course, to whom I now return," and leaped and was upon her suddenly extended palm.

She clutched the Simule to her breast and said, "Those gauntlets —!"

"I put them on because I did not know what sort of creature the Simule might be. I feared it might bite. Please give him back that I might question him further —"

"You fool!" she said. "Point your hands in another direction, unless you wish to die! Do you not know who I am!"

Then Stain knew.

"I did not know..." he said.

In Shadowhall in Morgenguard the Angel of Death stands within ten thousand transport cubicles. Morenguard, who controls the destinies of all civilized worlds, briefs his agents for anything from ten seconds to a minute and a half — and then, with a clap of thunder, dispatches

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them. A second later — generally — there is a flash of light and a brief report, which is the word "Done," and there then follows another briefing and another mission.

The Angel of Death is, at any given moment, any one of ten thousand anonymous individuals whose bodies bear the mark of Morgenguard, after this fashion:

Selected before birth because of a genetic heritage which includes heightened perception and rapid reflexes, certain individuals of the *homo sapiens* variety are given a deadly powerful education under force-fed conditions. This compensates for its brevity. At age fourteen, they may or may not accept employment in the service of Morgenguard, the city-sized machine created by the mutual efforts of all civilized peoples over a period of fifteen years and empowered to manage their worlds for them. Should any decline, these individuals generally proceed to excel in their chosen professions. Should they accept, a two-year period of specialized training follows. At the end of this time, their bodies have built into them an arsenal of weapons and numerous protective devices and their reflexes have been surgically and chemically stimulated to a point of thoughtlike rapidity.

They work an eight-hour day, five days a week, with two daily coffee breaks and an hour for lunch. They receive two vacations a year and they work for fourteen years and are retired on full salary at age thirty, when their reflexes begin to slow. At any given moment, there are always at least ten thousand on duty.

On any given workday, they stand in the transport cubicles in Shadowhill in Morgenguard, receive instructions, are transported to the worlds and into the presence of the individuals who have become superfluous, dispatch these individuals and depart.

He is the Angel of Death. Life lasts long, save for him; populations would rise up like tidal waves and inundate worlds, save for him; criminals would require trials and sentencing, save for him, and of course history might reflect unnecessary twistings and turnings, save for the Angel of Death.

One dark form might walk the streets of a city and leave that city empty of life at its back. Coming in lightning and departing in thunder, no world is foreign, no face unfamiliar, and the wearer of the black gauntlets is legend, folklore and myth; for, to a hundred billion people, he is but one being with a single personality.

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All of which is true. Quite, quite true.

And the Dark Angel cannot die.

Should the near-impossible occur, should some being with speed and intrepidity be standing accidentally armed at the moment his name on the roll yonder and up is being shouted, then the remains of the stricken Dark Angel vanish as, with a simultaneous lightning-and-thunder effect, another takes his place, rising, as it were, out of ashes.

The few times that this has occurred, the second has always finished the job.

But this time things were different; and what little remained of seven agents of Morgenguard had lain in cubicles, smouldered, bled, been dead.

"You are the Dark Angel, the Sword of Morgenguard," she said. "I did not mean to love you."

"Nor I you, Galatea, and were you only a mortal woman, rather than a retired Angel yourself — the only being whose body would throw back the charge upon me and destroy me, as it did the others — please believe that I would not raise my hand against you."

"I would like to believe that, Stain."

"I am going now. You have nothing to fear of me."

He turned and headed toward the door.

"Where are you going?" she asked him.

"Back to my hotel. I will be returning soon, to give a report."

"What will it say?"

He shook his head and left.

But he knew.

He stood in Shadowhall within the thing called Morgenguard. He was the Angel of Death, Emeritus, and when the old familiar voice crackled over the loudspeaker and said, "Report!" he did not say, "Done." He said, "Extremely confidential," for he knew what that meant.

There came a flash of lightning, and he stood in a larger hall before a ten-story console, and he advanced toward it and heard the order repeated once more.

"One question, Morgenguard," he said, as he halted and folded his arms upon his breast. "Is it true that you were fifteen years in the buildings?"

"Fifteen years, three months, two weeks, four days, eight hours, fourteen minutes and eleven seconds," Morgenguard replied.

Then Stain unclasped his arms, and his hands came together upon his breast.

Morgenguard may have realized in that instant what he was doing; but then, an Angel's body

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has built into it an arsenal of weapons and numerous protective devices and his reflexes have been surgically and chemically stimulated to a point of thought-like rapidity; also, Stain had been recalled from retirement because he was one of the ten fastest who had ever served Morgenguard.

The effect was instantaneous. The clap of thunder was not Morgenguard's doing, for he did not remove Stain in time.

The Dark Angel might never strike itself. The seven who had approached the lady Galatea had suffered from a recoil-effect from her own defense system. Never before had the power of the Dark Angel been turned upon himself, and never in the person of one. Stain had workd it out, though.

Death and destruction meeting automatic defense meeting recoil meeting defense recoil defense recoil breakthrough, and a tremendous fireball blooming like an incandescent rose rose within the heart of the city-sized machine Morgenguard.

Right or wrong, Simule will have some years to grow, he knew, in that instant, and —

— and somewhere the sun is shining, and its heart is the mobius-burn of the Phoenix Action/Reaction. Somewhere the sun is always shining, any time you care to think about it. Try to remember that, if you can. It is very important.

She remembers. Her name is Galatea. And we remember.

We always remember . . .

—ROGER ZELAZNY

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WE'RE COMING THROUGH THE WINDOW

by K. M. O'DONNELL

Help! I made a bad mistake while trying to construct a time machine — I succeeded!

Dear Mr. Pohl:

Unfortunately I, William Coyne, cannot send you a manuscript for consideration due to reasons very much beyond my control which you will soon understand. All that I can do in the very limited time and with the limited opportunities available is to write things down as best I can in the form of this letter and hope that you will be patient and understanding enough to see the great story possibilities in my problem. Perhaps after you see how important and unusual the situation is here you will consent to write a story out of it yourself and keep 50% (fifty per cent) of the proceeds which seems fair enough because you don't have to think up any ideas. Or, if you find yourself too busy to write it, you might turn it over to one of your regular authors in which case he will do the same thing and I will allow him only 40% (forty per cent) of the sale price. But since this is a million-dollar idea as you will see, there should be plenty of money in it for everyone if you'll only *work fast.*

Last week I, William Coyne, invented a time machine. That is correct, *I* created from my own notes the first time machine. I, William Coyne, 29 years old, unemployed and presently living in very cramped quarters. I built it by myself in these three furnished rooms on the West Side of Manhattan, running back and forth between the hall sink and my bedroom because, like my own body, the mechanism is 85% undistilled water. The machine worked out very well, considering that I know next to nothing about electronics and the only science courses I have ever taken were for my high school equivalency diploma. I am not very advanced, as they say. Instead, I just kind of fiddle around and I guess I fiddled myself into the machine.

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It is a very simple device, Mr. Pohl, and a very successful one; the only trouble is that its range is extremely limited. At the present time it will take me back only four months into time or forward seventeen minutes, it is poorly calibrated and at no time can I leave the actual time field which embraces only five square feet. It is an early model and it will have to be refined then on part of the proceeds from the story you will write about me.

In spite of the problems though, it definitely works. Just last Tuesday I shot myself back three months in time, found the newspaper of that date lying on my desk and my own humble form, the form of William Coyne, tossing fitfully upon the bed. It was an eerie experience, meeting myself for the first time and it shook me up considerable. But when I came back to the present time with the help of the machine and before I could even look around, I was interrupted by the dashing appearance of my double who motioned me urgently and requested in a whisper that four minutes hence I would please go backward four minutes in time. Then he — me — vanished.

It was very frightening, let me tell you, talking to myself, William Coyne in my own rooms. But I counted off the four minutes and used the machine to go backwards; then I met *my* earlier self and told him — me, that is — to go back four minutes in four minutes. Like that.

All right, Mr. Pohl, I know what you're thinking right now. You're saying that this is all old stuff for you and your writers (even though in my case, the case of William Coyne, it happens to be one hundred per cent (100%) absolute true fact) and that you've seen it a thousand (1,000) ways. I read science fiction too or I used to read it before I got into this mess. But stay with me, Mr. Pohl. There are a couple of things I haven't explained to you yet which will make clear why this situation is 100% sockaroo for a good man like yourself.

You can imagine how I got the plans for the time machine, of course. That's right, a few months ago I woke up in the morning to find all of them written out for me in my own handwriting on my dresser table (that was what I did when I shot myself back the first time). I just used them. So I guess I didn't really invent it — or, that all of us invented it. But that is of little importance, Mr. Pohl, except to point out that I am not a creative genius and that is why I need help in my situation very, very fast.

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You see the trouble is this: I told you that the machine didn't calibrate exactly and every time I go back to the present I don't get to the *exact* present but instead a few seconds or minutes off in either direction. So now, every time I jump around, I always come back to meet myself and if I jump back and try to come in exactly on time I just make more difficulties. The same thing happens every time I go back in time; I'm always meeting myself on the way.

Well, what it comes down to is this: I'm always coming across myself now and the more I try to straighten things out the worse it gets. As a matter of fact, Mr. Pohl, I'm afraid to make any more jumps because the more I've tried to straighten out this situation, the worse it's become.

Well, the truth is that there are now about three hundred (300) of us in these rooms, Mr. Pohl, all of us fooling around with these small time machines and none of us getting along very well. I mean, *I've* stopped trying to straighten myself out but most of the others haven't yet . . . they have to learn the hard way and in the meantime there are just more and more of us. Right now there are about 310 (three hundred and ten) for instance, just in the few short minutes I've been able to borrow the typewriter from the other 53 of us who all are trying to write letters for help.

As a matter of fact, we're about to be evicted for overcrowding, Mr. Pohl, and in the bargain there's just no food or space left here any more. And any time one of us goes out for food he seems never to come back with it . . . not that it would do us any good because I had two cents (2c) in my pocket when this all began and we would need several thousand of us to get enough food to feed ten of us if you see what I mean.

This is my situation, the situation of William Coyne. What can I (we) do? We need to make big money from the machine real fast, that's the point, but we can't get out of the field so how are we going to make it? And then we just keep on meeting up with ourselves and having to explain things all over again and we're all dead broke. Please, please: would you have one of your writers if not yourself write a story about me (about us) and send the money just as soon as you can? We're all kind of desperate, here.

Hopefully,

WILLIAM COYNE
William Coyne
William coyne & . . . .

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Ginny Wrapped in the Sun

by R. A. LAFFERTY

That Ginny! Charming, laughing, dainty, all men are her complete slaves — as she means them to be!

"I'm going to read my paper tonight, Dismas," Doctor Minden said, "and they'll hoot me out of the hall. The thought of if almost makes the hair walk off my head."

"Oh well, serves you right, Minden. From the hints you've given me of it, you can't expect easy acceptance for the paper; but the gentlemen aren't so bad."

"Not bad? Hauser honks like a gander! That clattering laugh of Goldbeater! Snodden sniggers so loud that it echos! Cooper's boom is like barrels rolling downstairs, and your own — it'll shrivel me, Dismas. Imagine the weirdest cacophony ever — Oh no! I wasn't thinking of one so weird as that!"

Musical screaming! Glorious gibbering with an undertone that could shatter rocks! Hooting of a resonance plainly too deep for so small an instrument! Yowling, hoodoo laughing, broken roaring, rhinoceros runting! And the child came tumbling out of the tall rocks of Doolen's Mountain, leaping down the flanks of the hill as though she was a waterfall. And both the men laughed.

"Your Ginny *is* the weirdest cacophony I can imagine, Dismas," Doctor Minden said. "It scares me, and I love it. Your daughter is the most remarkable creature in the world.

"Talk to us, Ginny! I wish I could fix it that you would be four years old forever."

"Oh, I've fixed it myself, Doctor Minden," Ginny sang as she came to them with a movement that had something of the breathless grace of a gazelle and

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something of the scuttering of a little wild pig. "I use a trick like the hoodoo woman did. She ate water-puppy eggs. She never got any older, you know."

"What happened to her, Gin?" Doctor Minden asked Ginny Dismas.

"Oh, after a while she got gray-headed and wrinkled. And after another while her teeth and hair fell out, and then she died. But she never did get any older. She had everybody fooled. I got everybody fooled too."

"I know that you have, Ginny, in very many ways. Well, have you eaten water-puppy eggs to get no older?"

"No. I can't find out where they lay them, Doctor Minden. I've got my own trick that's even better."

"Do you know, Ginny, that when you really cut loose you are the loudest little girl in the world?"

"I know it. I won it yesterday. Susanna Shonk said that she was the loudest. We hollered for an hour. Susanna's home with a sore throat today, but there isn't anything the matter with me. Hey, has that house ever been there before?"

"That house? But it's our own house, Ginny," her father Doctor Dismas said softly. "You've lived in it all your life. You're in and out of it a thousand times a day."

"Funny I never saw it before," Ginny said. "I better go see what it looks like on the inside." And Ginny hurtled into the house that she was in and out of a thousand times a day.

"I'll tell you a secret, Dismas," Doctor Minden said. "Your small daughter Ginny is not really beautiful."

"Everybody thinks that she is, Minden."

"I know. They all believe her the most beautiful child in the world. So did I till a moment ago. So will I again in another minute when I see her come out of the house. But her contemporary, my small son Krios, told me how to look at her; and I do so. For an instant, out of her incessant movement, I forced myself to see her as stopped cold, at rest. She is grotesque, Dismas. If ever she pauses, she is grotesque."

"No, she is like ultimate matter. Existence and motion are the same thing for her, and there cannot be the one without the other. But I've never seen her stopped, even in sleep. She's the liveliest sleeper anyone ever watched — a laughing and singing sleeper. Her mother calls her our beautiful goblin."

"Exactly, she's a goblin, a monkey, a kobald. She's even grown a little pot like one of them. Dismas, she has a monkey

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face and bandy legs and a goblin's own pot."

"No, she hasn't! There she goes! Out of the house and up into the rocks again, and she's so beautiful that it shakes me. Four years old — and she can still look at the world and say, 'Funny I never saw you before!' Yes, I've got a multidimensional daughter, Minden. Also a neighbor who is either deep or murky. You keep feeding me snatches of that paper of yours so I suppose that you want to excite my curiosity about it. And the title — *The Contingent Mutation*. What is? Who is?"

"We are, Dismas. We are contingent, conditional, temporary, makeshift and improbable in our species. Mine is a paper badly conceived and badly put together, and I shiver at the reception that it will get. But it is about man, who is also badly conceived and badly put together. The proposition of my paper is that man is descended, recently and by incredible mutation, from the most impossible of ancestors, Xauenanthropus or Xauen Man. The answer of that descent scares me."

"Minden, are you out of your mind? Where is the descent? Where is the mutation? The Xauens were already men. No descent and no mutation was required. The finds are all fifteen years old. One look at Xauen, and everybody saw instantly that the Neanderthals and Grimaldi and Cro-Magnon were all close cousins of the same species — ourselves. They were the template, the master key. They unriddled every riddle. We saw why the chin or lack of chin was only a racial characteristic. We saw it all. There is nothing to distinguish the Xauens from ourselves except that their adults were badly made ganglers, and probably unhealthy. The Xauens *are* modern men. They are ourselves. There is nothing revolutionary about stuttering out fifteen-year-old certainties, Minden. I thought your paper was to be a giant stride. But it is only stepping off a two-inch curb."

"Yes, an abysmal step off a two-inch curb, Dismas, backwards and around the world, and standing on one's head and turning into a howling monkey in the process. It isn't a simple step. If I am correct, Dismas, then our descent from the Xauens was by an incredible, sudden and single mutation; one that has been misunderstood both as to effect and direction."

"I've never been quite satisfied with Xauens myself. There is something misshapen about the whole business. Of course we know the Xauens only by the

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skeletons of ninety-six children, three adolescents, and two adults. We are bound to find more."

"If we do, we will find them in the same proportion. Oh we will not recognize them at all. But does it not seem an odd proportion to you? How come there were so many kids? And how come — think about this a long, long time, will you? — that eighty-six of those kids were of the same size and apparently of the same age? The Xauen skeletons came out of nine digs, close together both in location and age. And of the total of one hundred and one skeletons, eighty-six of them are of four-year-old kids. Sure the Xauens are modern man! Sure they are ourselves chin to chin. But eighty-six four-year-old kids out of a hundred and one people is not a modern proportion."

"You explain it then, Minden. I suppose that your paper attempts to. Oh, scatter-boned ancestors! Here comes the religious nuts!"

Doctors Dismas and Minden had been sitting in the open parkland in campesino chairs, in their own fine neighborhood between Doolen's Mountain and the lower brush-land. Doctor Dismas drew a hog-nosed pistol from under his arm at the sight of the nuts who had shuffled up that way several times before.

"Be off!" Dismas barked as the nuts crowded and shuffled up closer from the lower brush-land. "There's nothing around here you want. You've been here a dozen times with your silly questions."

"No, only three times," the nut leader said. He was clean-shaven and short-haired in the old manner still affected by fanatics, and he had Fool written in every line of him. "It's a simple thing we seek," the leader sniffled. "We only want to find the woman and kill her. I believe that you could help us find the woman."

"There is no women here except my wife!" Doctor Dismas said angrily. "You have said yourselves that she isn't the woman. Be gone now, and don't come back here again."

"But everything that we know tells us that the woman is somewhere near this place," the nut leader insisted. "She is the woman who will bear the weird seed."

"Oh, well, there are some who say that my daughter Ginny is a weird seed. Be off now."

"We know Ginny. She comes down sometimes to mock us. Ginny is not the seed, but there is something of it about her. Ginny is born and already four years old. The seed that we are seeking to kill is still in the womb. Are you sure that your wife — "

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"Dammit, do you want a public pregnancy test? No, my wife is not!"

Doctor Dismas shot a couple of times around the feet of the nut leader, and the whole gaggle of the nuts shuffled off again. "It is only a little thing we seek, to find and kill the woman," they snuffled as they went.

"They may be right, Dismas," Doctor Minden said. "I've been expecting the weird seed myself. I believe that it may already have appeared several times, and such nuts have killed it several times. The contingent mutation *can* come unhinged at any time. It always could. And when it does, the human world can well pass away. But this time they won't be able to find the woman to kill her."

"This is fishier than Edward's Ichthyology, as we used to say in school. I begin to understand why you're afraid of the reception that your paper might get. And you, as well as I, seem to have developed a little weird seed lately."

"Yes, my young and my older son are both acting most peculiar lately, particularly in their relation to the Dismas family. My son Dall has been jilted by your daughter Agar, or is it the other way around? Or have they both been jilted my your small daughter Ginny? As far as I can arrive at it, Ginny told them that that sort of stuff is out, no longer necessary, not even wanted on their parts. She is obsoleting them, she says.

"And my four-year-old son Krios is about out of his mind over your Ginny. He is so advanced in some ways and so retarded in others. It seems as though he grew unevenly and then stopped growing. I worry about him."

"Yes, Ginny has acquired several more small boy friends now. She says that you break the fort with a big ram and you break the ram at the same time and throw it away. And then you find better tools to take it over. I don't know what she's talking about. But Krios is jealous as only a passionate four-year-old can be."

"Krios says that Ginny is bad and she made him bad. He says that he doesn't know the words for the way they were bad, but that he will go to Hell for it."

"I had no idea that children were still taught about Hell."

"They aren't. But they have either intuitive knowledge of the place, or a continuing childhood folk legend of it. Oh, here comes bad Ginny and her mother, and they both have that stubborn look on them. You have two strong women in your house, at

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least. I wish that Agar were; for my son Dall isn't, and one of them should be."

Ginny and her mother Sally came hand in hand with the air of something needing to be settled.

"I want to be fair about this, father," Ginny called solidly. "What I like about me is that I am always so fair."

"That's also what I like about you, Ginny," said Doctor Dismas, "and what is the argument?"

"All I asked of mother is that she make me three thousand seven hundred and eighty peanut butter sandwiches. Isn't that a fair request?"

"I'm not sure that it is, Ginny," Doctor Dismas said. "It would take you a long time to eat that many."

"Of course it will, twelve hundred and sixty days. But that makes only three a day for the time I have to stay hidden in my nest up in the rocks. I figured that out by myself without paper. A lot of kids that have been to school already can't figure as well as I can."

"I know. A precocious daughter is a mixed blessing," her father said.

"Oh, Ginny, you're going to get a paddling," her mother said. "I made you three of them, and you said that you weren't even hungry for them."

"Father, who is this woman who talks to me so brusquely?" Ginny demanded.

"She is your mother, Ginny. You have been with her every day of your life and before. You have just come out of the house with her, and you still stand hand in hand with her."

"Funny I never saw her before," Ginny said. "I don't believe that this woman is my mother at all. Well, I will get my servants to make the sandwiches for me. Serpents kill you, woman! — Oh, no, no, nobody touches me like that!"

Musical screaming! Wailing of a resonance too deep for so small an instrument, as Ginny was dragged off by her mother to get paddled. Howling to high Heaven, and the plainting of wild hogs and damned goblins!"

"She is in good voice," Doctor Minden said. "When she speaks of her servants, she means your daughter Agar and my son Dall. It scares me, for I almost know what she means. It is eerie that two compatible young people say they will not marry because a four-year-old child forbids them to do it. It scares me still more when I begin to understand the mechanism at work."

"What is the mechanism, Minden?"

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"The mutational inhibitions. It's quite a tangled affair. Do you remember the Screaming Monkeys of boondocks Rhodesia twenty years ago?"

"Vaguely. Bothersome little destructive monkeys that had to be hunted down and killed — hunted down by a sort of religious crusade, as I remember it. Yes, a mutation, I suppose. A sudden wildness appearing in a species. What is the connection?"

"Dismas, they were the first, the initial probe that failed. Others are on the way, and one of them will not fail. The story is that the religious crusaders said that no human child could be born while the Howling Monkeys flourished, for the monkeys themselves were human children. Well, they were. Well, no, they weren't children. And they weren't human. But, in a way, they had been both. Or at least —"

"Minden, do you know what you *do* mean?"

"I hardly do, Dismas. Here come the 'servants.' "

Dall Minden and Agar Dismas drove up in a little roustabout car and stopped.

"What is this nonsense I hear that you two are not going to get married?" Doctor Dismas demanded.

"Not unless Ginny changes her mind, father," Agar said. "Oh, don't ask us to explain it. We don't understand it either."

"You are a pair of damned useless drones," Dismas growled.

"Don't say that, Dismas," Doctor Minden gasped. "Everything begins to scare me now. 'Drones' has a technical meaning in this case."

"Ginny has just suffered an ignominy past bearing," Agar grinned. She was a nice pleasant girl. "Now she is sulking in her cave up in Doolen's Mountain and has sent word for us to come at once."

"How has she sent word?" Doctor Dismas demanded. "You two have just driven up."

"Oh, don't ask us to explain, father. She sends us word when she wants us. We don't understand it either. We'll go up on foot."

"Where is all this going to end?" Doctor Dismas asked when the two grinning young drones had left them and were ambling up the mountain."

"I don't know, Dismas," Minden told him. "But I believe it may as well begin with a verse:

Salamanders do it,
Tadpoles and newts do it.
Why can't me and you do it?

"It's a verse that the four-year-olds have been chanting, and you may not be tuned in to them.

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And the peculiar thing is that the salamanders and newts and tadpoles *are* doing it now, more than ever before. It's worldwide. See Higgleton's recent paper if you don't take my word for it."

"Oh, great blithering biologists! *What* are the squigglers doing more than ever before?"

"Engaging in neotic reproduction, of course. In many pocket areas, tadpoles are reproducing as tadpoles for several years now, and the adult frog species is disappearing. There have always been cases of it, of course, but now it is becoming a pattern. The same is true of the newts and salamanders. And remember that all three are, like man, contingent mutations. But how do the four-year-old children know about it when it is still one of the best kept secrets of the biologists? . . . Here comes my wife. Is it more family trouble, Clarinda?"

"Oh, Krios has locked himself in the bathroom, and he won't come out or answer. He's been acting abominable all morning. Have you that emergency key you made?"

"Here. Now get the boy out, whip him gently but painfully, then explain to him that we love him very much and that his troubles are our troubles. Then get dinner. This family here never eats, unless it is peanut butter sandwiches, and has not thought to ask me to dine with them. Get you back next door and with it, Clarinda, and stop bubbling."

"There is something really bothering Krios," Clarinda Minden bubbled yet, but she got herself back next door.

"Where shall we take it up, Dismas?" Doctor Minden asked. "With the howling monkeys of boondocks Rhodesia who may once have been human children? But nobody believes that. With the neotic salamanders and newts and pollywogs? With the Xauens who were either our grandparents or our grandchildren? Or with ourselves?"

"Roost on the Xauens a while," Doctor Dismas said. "You didn't quite finish your screed on them."

"Humans descend from the Xauens. Australopithecus no. Sinanthropus no. They were creatures of another line. But Neanderthal, Cro-Magnon, Grimaldi and ourselves are all of one species, and we descend from the Xauens. It is not true, however, that we have only one hundred and one skeletons of the Xauens. We have more than twenty thousand of them, but most of them are called Ouezzane Monkeys."

"Minden, you're crazy."

"I am talking about the three-foot-tall, big-headed running monkeys who were mature and full grown at four years of age

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and very old at fourteen. They threw a few sports, steers and freemartins, who passed the puberty age without effect and continued to grow. They were gangling drones, servants of the active species, and of course sterile. They were the one in one hundred occurrence and of no importance. And one day they bred, set up a mutational inhibition against the normal; and mankind — the privileged mutation — was born.

"The Ouezzane Monkeys, of whom the Xauens were the transitional state, were the same as the howling monkeys of boondocks Rhodesia — going in the other direction. They had no speech, they had no fire, and they made no tools. Then one morning they were the Xauens, and the next morning they were humans. They passed all the highly developed apes in an instant. They were the privileged mutation, which is not, I believe, permanent.

"Dismas, the one hundred and one recognized Xauen skeletons that we possess are *not* of ninety-six children (eighty-six of them apparent four-year-olds), three adolescents and two adults. They are of ten infants and children, *eighty-six adults,* two mutants and three filial-twos.

"Let's take it from the flank. A few years ago, a biologist amused himself by making a table of heartbeat life lengths. All the mammals but one, he found, lives about the same number of heartbeats, the longer-living species having correspondingly slower heartbeats. But one species, man, lives four or five times as long as he should by this criterion. I forget whether the biologist implied that this makes man a contingent species living on borrowed time. I do imply it. In any case, since the biologist was also involved in science fiction, his implications were not taken seriously.

"From the other flank. Even before Freud there were studies made of False Puberty, the sudden hot interest and activity that appears about age four and then goes away for another ten years. It's been many times guessed that back in our ancestry our true puberty was at such an early age."

"Minden, no species can change noticeably in less than fifty thousand years."

"Dismas, it can change in between three and nine months, depending on the direction traveled. Here they come back! Well, drones, did you settle Ginny down? Where are you going now?"

Agar Dismas and Dall Minden had sauntered down from Doolen's Mountain.

"We're going to get four hun-

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dred and seventy-three loaves of bread and four hundred and seventy-three jars of peanut butter," Agar said rather nervously.

"Yes, Ginny says to use Crispy-Crusty bread," Dall Minden detailed it. "She says it has sixteen slices to a loaf, so we can make eight sandwiches to a loaf and to a jar. There will be four sandwiches left over, and Ginny says we can have them for our work. She's going to stay in her cave for twelve hundred and sixty days. She says it will take that long to get her thing going good so nobody can bust it up. I think she's a numerologist at heart. This is going to take more than four hundred dollars. That's more than Agar and myself have saved up together. Ginny says to do it, though, even if we have to steal the money for it. And she says to be quick about it."

"Here come the religious nuts again," Doctor Dismas said. "I may have to kill one of the fools if they keep coming back."

"They won't come here this time," Agar said. "They'll prowl Doolen's Mountain from now on. They know it'll be there. But I don't think they'll kill Ginny. They don't understand what she is. They didn't understand the first time either; they didn't guess that it could possibly be one of the big ones. We are all hoping that they will kill me and be satisfied and think that they have done it. They will find me there where they think the woman should be, and that may fool them. Well, tootle! We have to hurry with everything or Ginny will be angry."

"No species can count itself secure that has not endured for ten million years," said Doctor Minden. "We still hear the old saying that evolution is irreversible. Hogwash! I have myself studied seven species of hogs washed away before one endured. The human race is so new that it has no stability. The majority of species do *not* survive, and we have lived only one tenth of the span that would tilt the odds for survival in our favor. Even the species that finally survive will commonly revert several times before acquiring stability. We could revert at any time."

"Revert to what?"

"To what we were, to what we still are basically, little three-foot-high, big-headed, howling monkeys, without speech, without fire, without tools, and with only a fifth of our present life span."

"Reversions are like cosmic disasters, Minden. They take a few thousand years to happen, and by that time we'll be gone."

"No, this can happen instantly, Dismas, by a single neotic conception. And then it becomes the

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norm by the mechanics of mutational inhibition. The reversion will inhibit the old normal. We have already seen that inhibition at work."

The very stones crying out like demented rooks! Bushes barking like coyotes! Green-colored yowling, and laughter that sang like a band-saw. And Ginny was in the middle of them again.

She was the howlingest kid ever pupped.

"I don't think that I will talk any more after today, father," she said solemnly after she had cut off her other noises." "I think I'll just forget how. I'll just holler and hoot and carry on. That's more fun anyhow.

"Why aren't my servants back with my provisions? They've had almost time to get back if they did everything at breakneck speed and had good luck. They might have had to go to more than one place to get that much bread and peanut butter, though. I doubt if I'll eat it. I just want to have it if I need it, and I wanted to teach them obedience. I'll probably start to eat meadow mice and ground squirrels tomorrow.

"Here comes Mrs. Minden crying over that Krios. What's the good of that?"

There was a keening. Clarinda was running and crying, and Sally Dismas had rushed out of the house and met her.

"Clarinda, what in the world has happened?" Doctor Minden cried, rushing to his tearful wife.

"Our baby Krios has killed himself."

"I told him to," said Ginny. "I'd gotten everything I wanted from him. I'll find better ones for the other times."

"Ginny!" Her mother was horrified. "I'll whip —"

"Don't punish the child, Sally," Clarinda Minden sobbed. "She's beyond good and evil. Whatever was between her and my baby Krios, it's better that I never know."

"Did I say something wrong?" Ginny asked. "The last thing I ever say, and it should be wrong? Doctor Minden, you know about things like that. What are you creatures anyhow?"

"People, Ginny," Doctor Minden said miserably.

"Funny I never saw any of you before. I sure don't intend to get involved with people."

Raucous rowling! Hound-dog hooting! Hissing of badgers, and the clattering giggle of geese! Shag-tooth shouting, and the roaring of baby bulls!

And a screaming monkey leaped and tumbled up the rocks like crazy water.

— R. A. LAFFERTY

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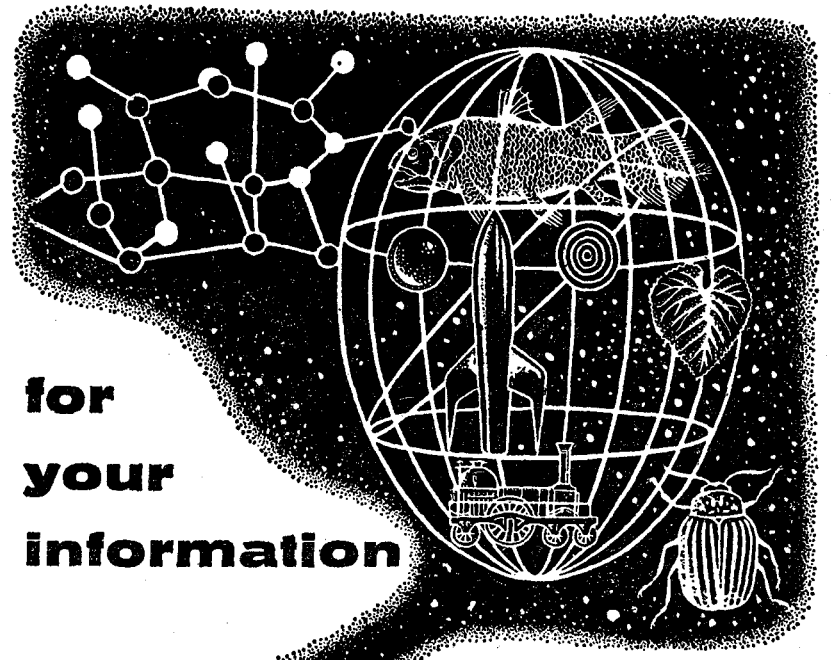

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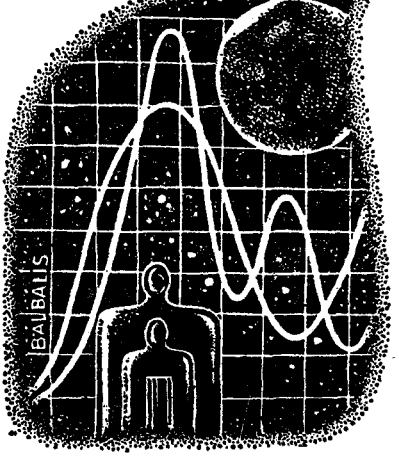

A PANGOLIN IS A PANGOLIN

The curator of a small college museum once produced some amusement for himself and his students in the following manner: He took a mounted specimen of a pangolin, removed the labels and put it all by itself in a display case in a prominent position. On Sunday, when the museum

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was open to anybody, a few students with index cards and pencils stood at the display, and every visitor who looked at it was handed an index card and asked to write down his opinion about the nature of the object displayed. The cards were then put through the slot of a suggestion box without comment. After the doors had closed, the curator unlocked the box, and he and his students read and sorted the cards.

Total count was 81 and the "vote" ran as follows: 36 visitors had written "lizard" or "tropical lizard"; 11 had guessed at a rare type of alligator (one had stated "alligator from Ecuador"); 15 had written "small dinosaur"; 8 had said that it was some kind of armadillo; 4 thought it was a man-made object and one had guessed that it might be a large pine cone. Precisely half a dozen had known that it was a pangolin.

What is a pangolin?

The first answer is that it is a mammal, just like you and me, or our cats. The overall length of a fully grown specimen is between 3 and 4 feet, depending on the species. It may be added at this point that all observers who saw pangolins in the open for the first time expressed surprise about its agility. The animal which, when dead and mounted, has a decidedly "wooden" look, can run fast and climb trees, sometimes hanging by its tail only.

The next question, logically, is where one would have to be to see a pangolin in the open. Quite a number of different places would do — for the pangolins, though nowhere numerous, have a wide distribution. Four species inhabit Africa, and three more live in Asia. But before we look at the distinctive characteristics of the different species a few general statements must be made. While the outstanding characteristic of the pangolins are the scales, they have hair too. The hair grows between the scales and on the underside; in old specimens the belly hair has often been worn away so that the tough skin is exposed. As a rule a female pangolin produces only one offspring at a time. The young is fairly large and always shows an exceptionally long tail, even in those species that are not very long-tailed when grown. One interesting point is that the newly born pangolin has just as many scales as it will ever have. As it grows larger, the individual scales grow larger, too, but their number does not increase.

One reason why pangolins are rarely seen is that they are nocturnal. For the better part of the day they sleep in burrows they

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dig quickly with the enormous claws of their front feet. Since one can find numerous burrows even where there are only a few pangolins around, it seems that they simply dig a new burrow when they feel like sleeping and do not bother to return to the burrow they slept in before. But captive specimens did not seem to mind shifting the sleeping schedules; they were willing to be up and around even in bright sunlight if food was provided.

Now for the different species. For a long time it had seemed natural to divide the pangolins into two families: the African pangolins and the Asiatic pangolins. But in about 1890 Professor Paul Matschie of the Berlin Society of Naturalists began a thorough study of all the known pangolins and came to the conclusion that all seven species form only one family, regardless of habitat. Because Matschie did such a thorough job, his classification is still in use. Beginning with the African species we have:

(1) *Manis tetradactyla* (originally named *M. longicaudata*, which means "long-tailed") with a tail much longer than the body. It has broad scales forming a point, the hairy portions of the body are dark brown in color. It

Fig. 1. *Manis temmincki.* The pangolin of the South African plains.

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is a very agile climber, as is the next species,

(2) *Manis tricuspis* which is also long-tailed. The hairy portions of the body are white, however, and the scales are narrow, the largest of them forming three points, hence the name.

(3) *Manis gigantea,* up to five feet long, is not a climber but a fast runner when needed. Its tail is only as long as the body and is pointed. The lower part of the forelegs is covered with scales, not with hair as in the first two. These three species live in tropical West Africa; the fourth African form,

(4) *Manis temmincki* lives in South Africa and the southern portions of East Africa. It is not a tree climber but an animal of the steppes. The tail is only as long as the body but very heavy with a rounded point.

The three Asiatic species are:

(5) *Manis pentadactyla* of India and Ceylon. The claws of its hind legs are *much* smaller than those of the front legs. The center row of the scales on its tail runs all the way to the tail tip, but on the underside the tail has a clearly defined spot where the skin is exposed. This is assumed to be a tactile organ.

(6) *Manis aurita* lives in Burma, Hainan and Formosa. The claws of its hind feet are also much smaller than those of the front feet, but the scales on the sides of the body and those of the hindlegs show a definite keel, which is missing in the case of *M. pentadactyla.* The seventh member of the family is

(7) *Manis javanica* of the Malay Peninsula and Indonesia. It has keeled scales like *M. aurita,* but the claws of the four feet differ only slightly in size, though those of the hind feet are still somewhat smaller. It is a tree climber, which may be the reason why it is less well known than the other pangolins.

Except for *Manis temmincki,* which was discovered by a Dutch traveler by the name of Smuts some ninety years ago, the pangolins came to the attention of European naturalists at an early period. References in old works are rare and, when there are any, they are short. Evidently the writers said nothing since they did not know what to say. This procedure of keeping quiet where there was no story was all right for books that just intended to acquaint the reader with the diversity of creation but it would not work if you wanted to be systematic. The great Swedish systematizer of both plants and animals, Carolus Linnaeus, at one time had to meet the challenge offered by the pangolins.

Systematizing is more than just

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description. It involves, among other things, the question of relatives. When it came to animals like the various wild oxen life was easy for Linnaeus; their common characteristics could not be overlooked even if one should try. The same went for the dog-like animals and for horses, asses and zebras. But what were the characteristics the pangolins shared with other mammals? The scales? Well, the beaver has a scaly tail, but the beaver was very obviously a rodent like rats, mice and squirrels. The pangolin, equally obvious, was not. It was one of those misfits that explorers had brought home from various points of the earth.

The aardvarks of Africa were misfits of the same kind, they did not seem to be related to anything else. Then there were the armadillos of Central and South America, and the sloths and, last but by no means least, the giant anteater.

Looking over this collection of animals that stood apart from all the others with such determination, Linnaeus suddenly saw something that could be used. The pangolins were completely toothless. So was the giant anteater. The armadillos do have teeth, but they are small and useless. The sloths do have strong teeth, but very few of them. There was a common characteristic — a comparative or complete lack of teeth.

Linnaeus may have felt faint doubts himself, but a classification has to be finished at some time, so he decreed the order of the *Edentata* ("the toothless ones"), and he finally had a place for aardvarks, anteaters, armadillos, pangolins and sloths.

Naturalists that came after Linnaeus were not completely happy with his *Edentata* but for about a century the classification was left alone. It was only during the latter part of the nineteenth century that some anatomists declared that Linnaeus had gone by something that was unimportant. The "order" was taken apart into three. One comprised all the pangolins and the pangolins only, and it was named *Pholidota,* from the Green *pholidotos* which means "armored with scales". The South American forms, the anteaters, the sloths (plus the then recently discovered giant sloths) and the armadillos (with their extinct relatives, the glyptodons) were left together as the *Xenarthra,* the "strange-jointed ones." The African aardvarks were put separately into an order named *Nomarthra* from the Greek word for "roaming."

There were other attempts. The giant anteater, the aardvarks and

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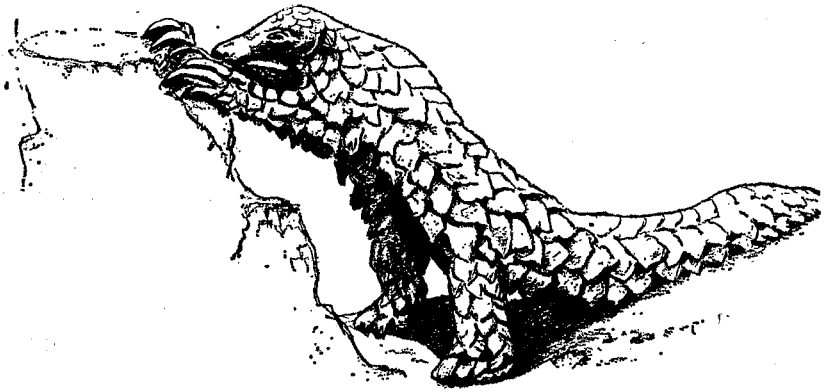

Fig. 2. *Menis pentadactyla*
The pangolin of India and Ceylon.

the pangolins share a preference for the same kind of food, namely termites (ants as well as termites in the case of the pangolins) and have developed the same method of eating. All three have long, slender and sticky tongues which they dangle into a cluster of termites so that the insects stick to the tongues. Then they pull their tongues in and swallow the catch. A few naturalists seriously suggested of grouping these three into an order of "worm-shaped-tongued animals" even though they have absolutely nothing else in common. It was as bad as the *Edentata* of Linnaeus, fortunately the majority of experts refused to go along with this. The other classification at least had the advantage of declaring the pangolins on the one hand and the aardvarks on the other to be isolated survivors from the past, not related to anything living.

Well, if the pangolins are not related to anything living, how about their relationship to extinct forms.

In other words, then don't fossils give some indication about their evolution?

The answer, unfortunately, is a straight "no". In the first place fossil pangolins are rare. In the second place the few fossils we have don't help.

The whole Tertiary Period is subdivided into five subperiods with a total duration of about 55 million years. The first of these subperiods is called the paleocene, with a duration of about 5

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million years. The following subperiods, named eocene, oligocene, miocene and pliocene shared a total duration of about 50 million years in about equal measure. Between the end of the pliocene subperiod and the present there is only the pleistocene (total duration about one million years) with its extensive glaciations.

Now let's see what we have as far as pangolin fossils are concerned.

There are some very poor remains from the eocene of France and the miocene of Bavaria, that is from areas where there are no pangolins at present. All that is proved by these remains is that pangolins did live in Europe during the Tertiary Period. Better fossils were found in India. One from the pliocene subperiod has been named *Manis sindiensis;* if this form were still alive it would simply constitute the eighth member of the family. Another fossil from the pleistocene of South India is identical with the living *Manis gigantea* of western Africa.

Evidently the pangolins split off from the other mammals prior to the eocene subperiod, possibly as early as the Cretaceous Period. They are an ancient tribe that acquired its special characteristics about 60 million years ago, and they haven't changed since then.

Since we cannot trace how the pangolins acquired their special features it remains to describe them. Not all their characteristics are unique, their tongues, as has been mentioned, have parallels in the tongues of the anteater and the aardvarks. Their enormous digging claws are shared with those of the aardvarks and, to some extent, with those of the armadillos and the anteaters.

But two characteristics are unique.

One of them are the very obvious scales.

The other is a construction of the stomach which is such that professors of zoology and of anatomy usually have to stress in their lectures that they are not indulging in some obscure scientific joke but are merely telling the truth. The fact is that the pangolins do have teeth, but in their stomachs.

But let us take the scales first.

The early naturalists like Linnaeus simply accepted them. They were an unusual feature to be sure, but there they were, they could be touched and counted. It was after Darwin and because of Darwin that others began to wonder whether they were true scales. In fact, because of the theory of evolution one was almost compelled to doubt that.

The ancestors of the mammals

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had been reptiles, and reptiles often have scales, though no reptile can sprout hair. The great innovation of the mammalian body was a mechanism for maintaining a constant temperature in the body. The mammalian body produced heat, and in order to avoid excessive heat losses an insulator had to be grown, a fur of some kind. Now it seemed logical that the mammalian skin that could grow hair had exchanged this ability for the ability to grow scales. Hence the scales of the pangolin had to be something that only *looked* like scales. Maybe the hairs grew in flat tufts and some kind of skin secretion made them stick together to produce imitation scales.

But if this were true, the pangolins should be born with a fur and one should be able to see the scales form. However, the newly born foot-long pangolin already has all its scales.

Fortunately this was a point that could be checked by dissection and the German zoologist Professor Max Weber, after carrying out such studies, stated his conclusion in no uncertain terms. "The scales can definitely be compared to the scales of reptiles, and the differences between this armor and that of the reptiles is only the difference that exists between the two kinds of skin, mainly the one that reptiles periodically shed their skins. In the case of the pangolins the losses that are caused by abrasion are covered by continued re-growth . . . the derma of the pangolins forms papillae that are folded over pointing in the direction of the tail. The papillae are covered by epidermis that turns into a horny substance, forming the scales." The way these scales grow explains why they can be erected and can also be moved laterally to some extent.

Of course it is still true that the mammalian skin, as a rule, has lost the ability to grow scales. The pangolins are just an exception to that rule. The skin of their ancestors retained the ability to grow scales, but it was also able to grow hair. As a matter of fact the pangolins even grow two kinds, ordinary hair between the scales and on the belly, and hairs that have special blood sacks around their roots at the tip of the mouth.

And now we come to the unique construction of its stomach. The principle with virtually all mammals is that the food is mechanically broken up by the teeth in the mouth. The stomach then goes to work on this mashed and saliva-coated food and does so by chemical means only. Reptiles lack teeth that can mash food; at best they can tear it into

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small pieces. The stomach of a reptile, therefore, has a much harder job and it is interesting to note that many of the larger reptiles swallow pebbles so that there is some mechanical mashing inside their stomachs.

It has been mentioned that two other kinds of living mammals eat insects in the same manner as the pangolins, by using their long and sticky tongues as traps: the South American anteater and the African aardvark. But in spite of its name the giant anteater does not eat ants but only termites, and the aardvark does the same. Termites are soft-bodied.

The pangolins eat termites *and* ants, and they seem to prefer ants. Since there are no teeth in the mouth the ants are swallowed whole, and the method of catching them makes it inevitable that sand grains and small pebbles arrive in the stomach along with the hard-shelled ants, many of which must still be twitching. This sounds like a most indigestible mixture. And it would be for any other stomach, but the pangolin stomach is built for it. It works with mechanical and chemical means at the same time.

At the entrance to the stomach the stomach walls are equipped with a hard horny skin that can exert considerable pressure and grinds up the ants and sand grains almost like millstones. In the center of the stomach the gruel of now crushed ants and saliva is attacked by stomach acids and other chemicals. As if this were not thorough enough the area that leads from the stomach to the intestine has another grinding mechanism in readiness, this time consisting of horny knobs that even look like teeth.

And this completes the picture of this creature, an animal that sprang from unknown ancestors more than 60 million years ago, with the bodily organization of a higher mammal, the scales of a reptile, the habits of an aardvark, the tree-climbing ability of a squirrel and with a stomach like nothing else.

It isn't a lizard, tropical or otherwise, nor a small dinosaur. It is neither a work of art nor a pine cone. It isn't even an armadillo. It is in a category of its own. It is a pangolin.

—WILLY LEY

★ ★ ★ ★ ★

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9-9-99

by RICHARD WILSON

Happy birthday, Charlie! Here's your present — a chance to kill yourself!

Sept. 9, 1999

Dear Charlie:

Today is my ninety-ninth birthday, as you know. I'm sure you join me in my self-congratulation, even if I haven't been favored by a formal greeting from you. With any luck the century will die before I do. You and I have been good at arranging our luck, haven't we, Charlie?

You recall our little wager, I trust, though we've rarely mentioned it since that birthday of yours on March 3, 1933, when you turned thirty-three and we commented on how it was possible to write the date 3-3-33. That's sixty-six years, six months and six days ago, Charlie. Imagine that! No doubt you also recall that as we drank a toast to you (in bootleg champagne; Prohibition wasn't repealed until 12-5-33) we noted that you'd never again have a birthday that could be represented by four identical digits. But you remarked that I would, if I lived to see the ninth of September, 1999, which is today, 9-9-99.

And then you bet me that I wouldn't live to see it, which was a cruel bet to make, and sometimes I almost wish I hadn't lived that long. But I have, Charlie, and so have you, and I intend to collect.

You remember the stakes, don't you, Charlie? You're not senile, any more than I am, and your memory is clear. Just check me on the facts, old friend.

We each took out a life insurance policy and named the other as beneficiary. They were

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pretty expensive policies for those depression days but we'd managed to pull out of the market before the crash. Furthermore, through dumb luck, or intelligent foresight, we'd kept the money out of the banks that later failed. So we could afford those fancy policies and could pay the fat premiums at a time when a lot of unhedged speculators were tumbling out windows and the man in the street was selling apples.

That was a long time ago, Charlie; we outlived the policies, as the actuaries say, and back in '65 the insurance company offered to pay us the face amounts. But we decided to keep them in force and to let the dividends accumulate.

There's quite a lot of money involved now, Charlie, a very nice nest egg for my old age. You were always good with figures and I'm sure you can tell me to the penny how much each of the policies is worth now; all I know is that my share, as your beneficiary, is more than half a million dollars.

And I want it.

So kill yourself, Charlie, as you agreed to do. And please don't give me any of that jazz about it having been a youthfully frivolous suicide pact which, now in our maturity, we can laugh over.

Choose your weapon, old friend, and do the deed.

I'm not laughing, Charlie. I want that money.

I repeat, it's 9-9-99 and I'm ninety-nine.

Drop dead, Charlie.

Your friend
Harry

9-9-99

Dear Harry:

You always did have a morbid sense of humor.

We ought to examine the situation. Here we are, in our old age (not in our dotage; we took steps to prevent such a state), looking back across the decades to our bygone youth, to the good old or bad old days when the world was our oyster and we opened it up and ripped out the pearl.

Let's assume that our pact is still in effect. There have been a lot of changes in the world and in ourselves since we made it but let's pretend; there's not much else to do.

How do you propose that I carry out my end of the alleged bargain? How to end it all?

In the old days, good or bad, it could have been done in any number of imaginative ways. I might, after a good dinner at Maxim's, have cast myself from the top of the Eiffel Tower. Or I could have favored New York

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with the happy dispatch and leapt from the observation platform of the Empire State Building. Or from the Golden Gate Bridge. But none of these works of man remains. Remember, Harry? All have been destroyed.

Mount Fuji remains, true. It might please your fancy to have me topple romantically into the crater from its sacred snow-capped peak. But unfortunately I have no way of getting there.

In the old days I could have thrown myself in front of a subway train, say at the north end of the Independent station at 59th Street as the A Train came roaring in from Harlem. But you know as well as I that no subways have run since 1986. Nor have any other forms of transportation.

Shoot myself? With what? You and I jointly arranged for the dismantling of all weapons and the sinking of them, from the Big Boy down to the bows and arrows in the museums, in the seven seas.

It wasn't so much for the good of humanity, you will recall, but to prevent anyone from rising up against the Charlie-Harry combine. You remember what it was we called ourselves, grandiloquently — the Greater Global Holding Company. Greater Global, sometimes known as Greta Garbo, GG on Gigi. Greater Global was you and me, Harry, and our hired hands in the U.N. who ran the political end for us. Aside from those dearly-bought hirelings it was just you and me and a host of cyberneticists, whose numbers dwindled as their machines became more efficient and sophisticated.

So there aren't any more weapons, Harry, and I can't shoot myself, or run on my sword, or blow myself up with a grenade or ride an H-bomb into eternity. None of these is possible any more, Harry. You and I fixed it.

Maybe you'd like me to swallow my tongue, Harry? I have no tongue, alas.

Maybe I should take poison, eh, Harry? But what would the poison have to work on? Chrome steel and acid-resistant alloys.

Come off it, Harry. I won't be so cruel as to say you're senile but you have become an eccentric old man, if what's left of you can be described as man.

Still your friend,
Charlie

9-9-99

Dear old Charlie:

You're the one who's living in the past, you poor turnip, not me. Your nostalgic maunderings don't touch me at all. The sole item on my agenda is that we had a bet and that you lost it and now you have to pay.

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If you've lost all sense of honor, if you're reneging, Charlie, just say so, without clothing your shame in sentimental claptrap.

If you won't kill yourself, Charlie, as you're dutybound to do, I'll have to kill you.

I'm coming to get you. Watch out.

Determinedly,
Harry

9-9-99

Poor old Harry:

If you came and got me — if it were possible and you did it — you'd be all alone, Harry, and you couldn't stand that. Who would you have around then to play with?

It saddens me that you've become vindictive in your old age. You ignore the fact that our wager was two-sided. You may have chosen to forget how pessimistic you were about my chances for longevity after my operation for cancer, when you bet that I wouldn't live to be sixty-five.

Your part of the wager was that if I did reach sixty-five your half of our combined fortune would be at my disposal, along with your power of attorney. I needed it all. My share of Gigi wouldn't have been enough to swing it. But our combined assets hired the greatest minds in bioengineering to build me a body to put my brain in. The cancer had started up again and my body was going fast but the brain was still one of the best.

You paid up like a man, Harry, and I was proud of you. Then later, when you developed cancer yourself (we lived under the same stresses, had similar bad habits, came from almost identical backgrounds), I fixed you up with a new body, too. I didn't have to do it, Harry; it wasn't in the agreement. I could have let you die and you'd have gone to perdition decades before the arrival of your mystical 9-9-99, and I'd have inherited under your insurance.

You remember how it was then, Harry. There we were, two indestructible machine men, possessors of the secret of immortality. We were getting ready to share that secret with suffering mankind. We'd share it at a price, of course. An exorbitant price, being businessmen (I almost said hard-headed businessmen, but our brains were the only parts of us that weren't hard).

That was when the jolly old holocaust came.

I trust you remember that, Harry, even if you are heading for your hundredth year. It was quite an experience, knowing that the eccentric asteroid Polemarchus had caromed off another which bore no name and had

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taken up a new heading on a collision course with Earth.

Naturally people were alarmed. There was a lot of wild scheming, a lot of praying. Somebody volunteered to go land on Polemarchus and attach an ion engine to steer it off course. Somebody else said what they had to do was quick make some new H-bombs and fire them at it. But there wasn't time for any of that, except prayer, and that didn't work.

In the confusion nobody noticed Greater Global's departure for Antarctica, where our calculations told us the shock would be least. We didn't share those calculations with the rest of the world. No time, I guess. Or maybe we wanted to be alone.

The impact was tremendous, and even we had a few rocky hours, prepared as we were. Polemarchus whomped Earth in its midsection and set up those tidal waves — none of your puny little tsunamis — that wiped out everything north of the 60th parallel.

If you put your aging mind to it, Harry, you'll remember how the devoted band of engineers and construction workers who came with us to Antarctica built us these eternally impregnable manhills in which we survive to this moment.

Unfortunately they, gallant trusting fellows that they were, perished of chilblains, or starvation, or whatever it was. I'm afraid that after their work was done neither of us cared very much what carried them off.

Sometimes you have a short memory, Harry. Or maybe you've just got a short.

Sadly,
Charlie

9-9-99

Charles:

You talk too much. Who needs your lugubrious history lesson? I'm coming to get you now. A bet's a bet and I mean to collect.

I'll pull your plug. I'll tilt your sun shield and you'll bake to death. I'll paint over your solar cells so your batteries won't recharge.

No quarter!

H.

Poor Harry!

No quarter, you say. How right you are. Not even a nickel. Who would you collect the insurance money from? We control all the wealth there is — namely, you and me and the tapes and reels of data stored in the bases of our living mausoleums.

If you weren't such a forgetful old sod — and if you had eyes instead of that electronic grid connected to your optic nerve — you'd know that our impregnable

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eternal towers are fixed half a mile apart here in the ice and that you can no more sneak over and do me dirt than I can slit my nonexistent throat or jump off the nonexistent Empire State Building.

So wake up, Harry. Admit that you've enjoyed your little birthday drama, your excursion into fantasy, and let's get back to the serious business of passing the time.

Wearily,

Charlie

9-9-99

Charlie!

That's exactly what I was doing, you garrulous old literal-minded, humorless remnant. Shook you up, didn't I? *I* enjoyed it. That's more than I can say for mental chess. I don't get much fun out of that pastime of yours. But if you must have your daily game — What's the score now, anyway?

Resignedly,
Harry

9-9-99

Harry, you bastard:

I thought I knew all your tricks!

Yes, you've won your birthday game. If there was any way to do it I'd have to blank myself out — if I had any sense of honor, which of course I haven't. So you've won. That should help your ego accept your dismal record in chess. The score happens to be 5,831 for me, 3,614 for you and 67 draws. Are you ready? You were white yesterday, so I go first. Pawn to Queen four. Mate in fifteen moves.

Confidently,
Charlie

9-9-99

C:

I resign.

H.

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(NON-FACT ARTICLE)

Travelers Guide to MegaHouston

by H. H. HOLLIS

Illustrated by WOOD

Welcome to MegaHouston! You've never been here before, but you will — in another half century!

When one sees MegaHouston from two or three hundred miles in space, the piled iridescent domes resemble a drift of soap bubbles spread in a sixty-by-forty-mile ellipse. It is easy then to understand why an enthusiastic Houston realtor once tried to nickname his city "Xanadu." The leathery East Texans, who constitute a significant, if diminishing, fraction of the great city's population, disdain exotica; they call the bubbly city, with wry affection, "Cromagnoli's Folly."

The affection is genuine, and so is the sour taste; for these oldsters would never consciously have voted for a program to make Houston what it has become, which is something rather different from a stately pleasure dome. Chairman Cromagnoli never admits that the result was planned. *He* calls MegaHouston a splendid unintentional bullseye. As time passes, however, and perspective sharpens on the (apparently) aimless process by which Old Houston transformed itself into the world's most spectacular exemplar of the age of technology, it becomes harder to accept Chairman Cromagnoli's words and easier to believe the twinkle in his eye.

It is certain that the city founded by the Allen brothers while Texas was an independent republic did not betray much po-

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tential for expansion until the Houston-Harris County Ship Channel was dug in 1919. Houston, as a city of any significance, was always a creation of technology; but never, until the impact of Como Cromagnoli, a conscious one. The Turning Basin, that considerable man-made lake at the foot of Navigation Boulevard which makes Houston a seaport fifty miles from the open sea, was the placid engine which generated whole families of Harris County fortunes; but there was no intellectual feedback from the Basin to Main Street. Today Harris County is beautiful and busy beneath its climate canopy because the era of technology has found its institutional expression in Mega-Houston.

Other great American cities seem to have had reasons of trade or of climate to explain their being where they are. Not so Old Houston, which began as a real-estate promotion. By mid twentieth century it still stood mostly in the former flood plain of Buffalo Bayou, a short, turgid river emptying into Galveston Bay. Although the land area had been reclaimed, miasmic fogs overlay it night and morning, and the haphazard burgeoning of industry, spread through residential areas by the fact that Houston was the largest city in the world without a zoning ordinance, had begun to turn natural lowland mist into chemically fortified smog.

Buffalo Bayou had become one of the world's most polluted waterways. The air of Harris County, already thick with humidity, was made dense with waste from Channelside industry. Automobile proliferation enriched the mix enough for the photochemical effect to take place, and a thousand poisons became visible in the atmosphere.

Engineers who might have supplied answers to the question of how to make the area livable were still being set piecemeal problems of making individual plants more profitable. Houston bragged (begging the question of its sub-tropical climate) that it was the most air-conditioned city in the world. In truth, it was not an air-conditioned *city* at all. It was only a random collection of air-conditioned homes, cars, offices and churches. One of the Gemini series of earth-orbiting experiments produced a profound shock to the collective Houston ego with a photo of the city made from space in 1966: a blob of haze from which rose a half dozen unmistakable columns of industrial smoke.

Yet the corner in the sweaty history of Old Houston had al-

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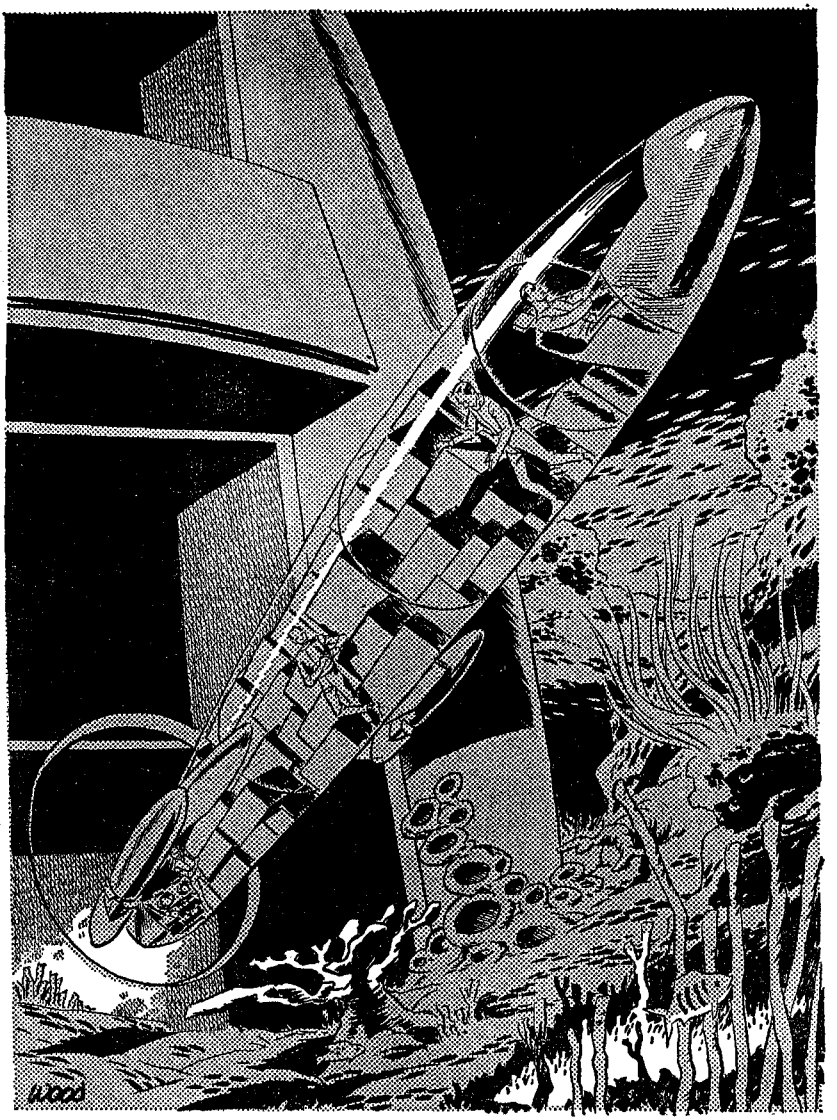

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ready been turned in the early sixties; as usual, without anyone's recognizing that a new era had begun. Onetime County Judge Roy Hofheinz is enshrined in Harris County mythology for having taken rain, heat, bugs and sharpshooting night birds completely out of the national pastime by, air-conditioning the ball park."

The technical device for accomplishing the Judge's assault on tradition already lay at hand in the form of Fuller's geodesic dome. Stable, cheap and beautiful, this structure had been adapted for use as homes, stores, factories and churches. In the botanical gardens of St. Louis and Mexico City it even contained small rain forests and other specialized ecologies. Once a politician of stature called for a commercially feasible treatment of Houston's climate, architects and engineers were able to draw plans based upon years of safe and satisfactory dome performance. The Harris County Domed Stadium is the cornerstone of the canopied metropolis.

It remained for a political tyro to recognize and consolidate the real significance of what the stadium began. Apparently Como Cromagnoli (already familiar with the Astrodome) was awakened to the endless versatility of the form by a visit to Canada's Expo '67, where the United States Pavilion was a twenty-story, nine-million-dollar, acrylic and steel geodesic bubble. But the central elements that combined in him to reshape the lives of so many millions are two: he was once a Houston school teacher exposed to the political storms which periodically wrecked the Houston Independent School District, and he was later a clerical employee of the Houston Harris County Ship Channel Navigation District, the (seemingly) non-political body which administered the Houston Ship Channel and its appurtenances.

The audacious but oblique first step toward putting Houston under glass was the political campaign in which Cromagnoli unveiled himself to public sight. With money supplied mostly by a well known engineering and construction firm, the former schoolteacher ran for the school board. In doing so, he disdained not only the traditional content of Harris County politics, but also the traditional objectives. The school board, though powerful and wealthy, had always been a graveyard of ambition, far from the historic levers of power, where the best of good wills were somehow manifested only in ugly, archaic political brawls.

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When elected, he held the one swing vote in a seven-member board, which elected Cromagnoli chairman because there was no other way to get the board functioning. He first restored the meetings to television, where they had once been the most popular show (a kind of excruciating situation comedy) on the University of Houston's educational channel.

In a totally unexpected move, Cromagnoli then asked, on camera, if any member of the board had any program sufficiently worked out to be on paper. This was a real violation of board etiquette. Traditionally, members had depended entirely on staff for any writing more demanding than epithets or yeas and nays.

Gavelling down the "hems" and "haws" of board members, who were caught as unprepared as first graders at a spelling bee on the second day of school, Cromagnoli reached into his portfolio for a thick handful of papers. Over the years, that gesture of the chairman, fraught with threat and promise, was to become a cliche of the televised board meetings.

As he held up a large sheet and beckoned the camera to him in a tight closeup, Como Cromagnoli had in his hand the bomb which was to shatter Houston's complacency, culture and economy. It was a beautiful architectural rendering of O'Brien and Rockwell's comprehensive design for a twenty-acre educational park with interrelated buildings for elementary, secondary and junior college level scholars, all contained in a glittering jewel of a dome. Old Houston fell in love with that picture, with all its startling implications.

The building of the school dome posed many problems, and the solutions often seemed to require the creation of some new industry in Houston. The Texas Gulf Coast had long been a center of the heavy chemical industry, and the exacting specifications of the Houston Independent School District and its architects for the plastic components of the dome were at last met only by the creation of a new plant capable of extruding the high impact, clear, scratch-resistant sections with the close tolerances that would keep the structure leakproof against Harris County's hundred and fifty per cent humidity.

Money was never a problem; for members of the social work community, who had become as skilled at grantsmanship as the James Boys had been at horsemanship, fell to in teams to write multiple applications

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that would exact the last dollar from HEW, OEO, NIH, Urban Affairs, Transportation and the Texas State Department of Education in Austin. To accomplish the job, they suddenly found themselves cheek by jowl with people who spoke mathematics as their first language. The idea that both groups had real functions in society was as startling to each as the discovery of a new sense organ would have been; and the big bubble cross-wired pools of skill whose whole previous existence had been independent of each other.

Although Houston had, in years past, used thousands of tons of air conditioning, most of the machinery had been fabricated elsewhere; but the enormous dome raised design problems no one in the industry had ever contemplated before. In the end, a team of engineers and philosophers detached themselves from the faculty of Rice University, got their radical ideas underwritten by one of the two Houston banks claiming to be the largest in the South and, after a precariously functioning demonstration, successfully bid in the air-conditioning contract.

The work was made difficult not only by the immensity of compressors and heat exchangers, but also by the design requirements that ducts should not mar the dome and that the air, once cooled, had to be kept on the move through twenty acres of park and buildings. The conventional response, erection of ventilating towers containing ducts and air returns, was turned down by the board as too factory-like. Air-conditioned trees (with ducts and blowers concealed in their leafy branches, like those already in use at Six Flags, Texas's answer to Disneyland) were rejected on the ground that machines small enough to be concealed in trees could not move enough air for the whole hemispherical space which was to be conditioned.

The suggestion to air-condition the buildings separately imperiled the whole project for a short time. It made little sense to dome the institution, if the buildings were to be supplied with individual machinery. A cost study was run up which showed a saving of millions by choosing this compromise; but after some soul searching, the board again voted for the project as originally dreamed.

RiceProCo, Inc. (the Rice Professors) solved the problem, both in terms of technique and of money, by making the air enclosed in the dome do most of the work. The space was large enough, after all, for the out-

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side heat to cause convection current inside. By modifying a little laboratory tornado maker into a reliable sort of air churn, great masses of air could be made to move themselves without creating fierce drafts. The resultant saving over the use of blowers and the increased efficiency from realizing much of the potential energy in the air mass enabled the job to be done with a quarter of the horsepower called for by the conventional solutions.

As the patrons of the school district stepped into the balmy air of the school dome on "Open Dome Day," and the sweat began to evaporate while they looked up through the clear beauty of glass and lucite, so that they knew it *worked,* thousands of individual resolves were born.

Within a week, O'Brien and Rockwell were inundated with demands for dome designs, large, small, residential, commercial and manufacturing. Every architect's office in Old Houston plunged into the competition, and City Hall was besieged with applications for dome building permits. Proposals ranged from the absolute functional beauty of the basic design through such refinements as solar glass to the ultimate faddishness of baroque domes encrusted with seraphim and magnolia blossoms of cast concrete. One famous Houston recluse ordered an opaque bubble of stainless steel. The design for a celebrated collector of modern art had each module an eye-straining work of optical art done in stained glass.

Structures such as those now proposed had no place in the city's building codes, yet there seemed no way in which to restrain the proliferation of the hummocks. What had been approved as a container for a ball park and an educational center could hardly be denied to textile manufacturers who saw the elusive goal of real humidity control within their grasp or to private citizens of means who suddenly understood that real control of their personal environment was now available for purchase.

About a hundred bubbles were built before their geometrically increasing numbers made it apparent that social control of some sort (abhorrent though the concept was to most Houstonians in any other context) would have to be exerted or the whole machinery of the city would be disrupted beyond repair.

The loveliest of these wild domes is that erected by Burton Claridge, the sprightly spinster heiress who always referred to herself as Houston's maiden aunt. Her domed home was the old

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lady's last building effort, and it is a magnificent hybrid which has drawn on Hagia Sophia in Istanbul for its architectural shape. That is, the building is a dome resting on a square base. The square prism of mellow pink Mexican brick surrounds what was an entire city block, and is unrelieved by any opening, save the great black iron front doors and the more utilitarian truck and delivery entrance on the back street. The "house" is the square, with the rooms surrounding the open center of the block. More than a dozen live oaks and five lofty pines were saved in this great inner court and can be seen from outside, thrusting up their crowns in evergreen promise. Air gates for squirrels and birds are in each quarter of the dome, just above the supporting brick walls, so the trees are alive with song and movement. The dome itself has each of its hexagonal modules framed in aluminum anodized in the color of gold, so that the trees appear to be enclosed in a cap of gilded lace.

As might have been expected of its builder, this superb edifice and the ground on which it stands were willed to the people of Houston by Miss Claridge, and the home in the brick square now houses an art collection, a historical library and an unsurpassed library of recorded music. It is one of the city's most beautiful and most used parks; but few of the other wild domes were built with such an eye to public utility.

Now that MegaHoustonians are all used to the arching domes that enclose the city and its neighborhoods in an orderly fortress against Harris County's anti-human climate and affect, when showing a visitor about, a blase acceptance of the canopies, the campaign to assure the adoption of the master-dome plan has been all but forgotten. But it was in that campaign that the unified pride of MegaHouston was forged.

As a consequence of Old Houston's lack of a zoning ordinance, the most exclusive of residential neighborhoods had been breached again and again by lumber yards, sheet-metal factories and the ubiquitous blighting convenience of the shopping center, which brought the grocer, the barber and the intimate little restaurant within walking distance, and rats, roaches, all-night neon signs and full load traffic as well. Even the city government sometimes seemed to be enlisted in the war against livable neighborhoods, as sewage and garbage disposal plants appeared overnight in residential areas. Citizens were resigned to

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the swift destruction of property values and green space.

The circumstances which combined to bring about the harmonious, comprehensive and logical plan, now seen to be so effective, must include the moving to Houston in the 1950's of the major oil companies' chief executive offices.

Old Houston had ceased to be a mere regional capital. Its establishment came to include a majority of men who commanded broad social responsibilities as well as great wealth. Next came the NASA administrators, wielding kingly powers on bureaucrats' salaries and charged as a duty to utilize technical resources to the utmost for purposes on which political agreement had been reached.

The other end of the financial spectrum included the sprawling masses of Houston's poor in the antique wards, creeping along the Bayou to the waterfront, and their reluctant allies on the North Shore, the high hourly wage workers whose high wages had never kept them from being vulnerable to the business cycle. They shared a conviction that private development of the domes would leave them in the humidity and pollution of industrial Houston, once more (and perhaps forever) on the outside looking in. Zoning had not moved these groups to vote. Doming did.

A famous engineer joined the dean of the new school of social work and a noted anthropologist in a statement which summed up the ideological content of the campaign. It began:

"Technology, by cutting the Ship Channel, created Houston as we know it, in a place where no large concentration of human beings ought to be. In the proven technical device of the dome, we have the instrument with which to ward off the less desirable features of our climate. In the Houston Harris County Ship Channel Navigation District, we have a managerial system capable of extending this engineering blessing fairly to us all. Let us entrust the power to remake Houston as we want it to a governing body with a history of honest and intelligent administration of the technical substructure on which Houston already depends and from which Harris County has already grown rich. We have wealth. Let us get health."

Houston's right-wing weekly newspaper, which went out of business a few months later with a proud record of never having supported a winning candidate, attacked the master dome plan as a device for Sovietizing

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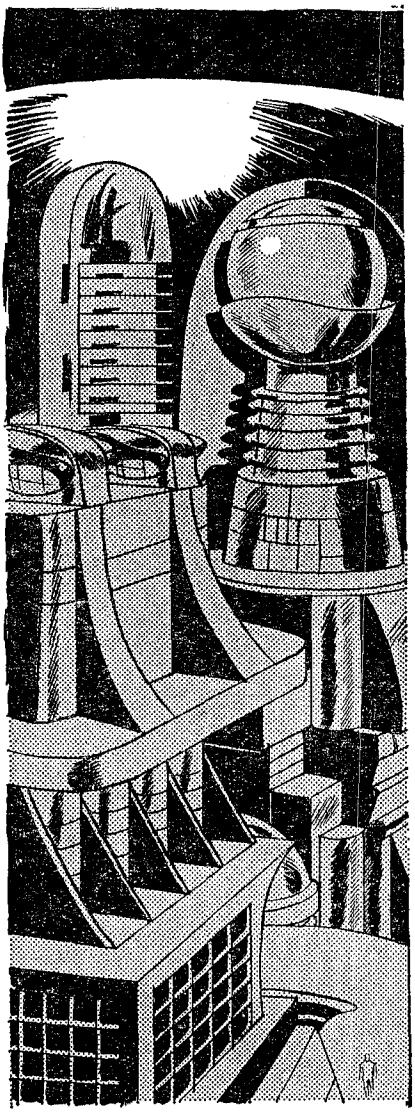
Harris County. This publication also unwittingly gave Cromagnoli the priceless opportunity to give a name to his formless movement. A questionnaire was sent to him which included a query as to his political identification. "I am," he wrote, "a *Technical* Democrat."

By voting in local option elections in large and small communities and in the county at large, the people of MegaHouston can now be seen to have adopted a new way of dealing with the problems of giant cities. They have never, in any subsequent election, failed to vote for what they have come to call "humane technology." Every step of its development has flowed from the technical requirements of the multiple domes.

The billion dollar bonded indebtedness which burdens the citizens of the District (and pays such fantastic dividends) was dictated by the engineering calculations. The walling off of the Ship Channel industrial area into its own "Crystal Palace," that immense tentacle of glass and stainless steel, was a compromise between the old what's-a-little-smell-in-the-air lobby and the engineering recognition that to let channelside pollution back into the other domes was to defeat their purpose. It was costly to build the overhead tunnel



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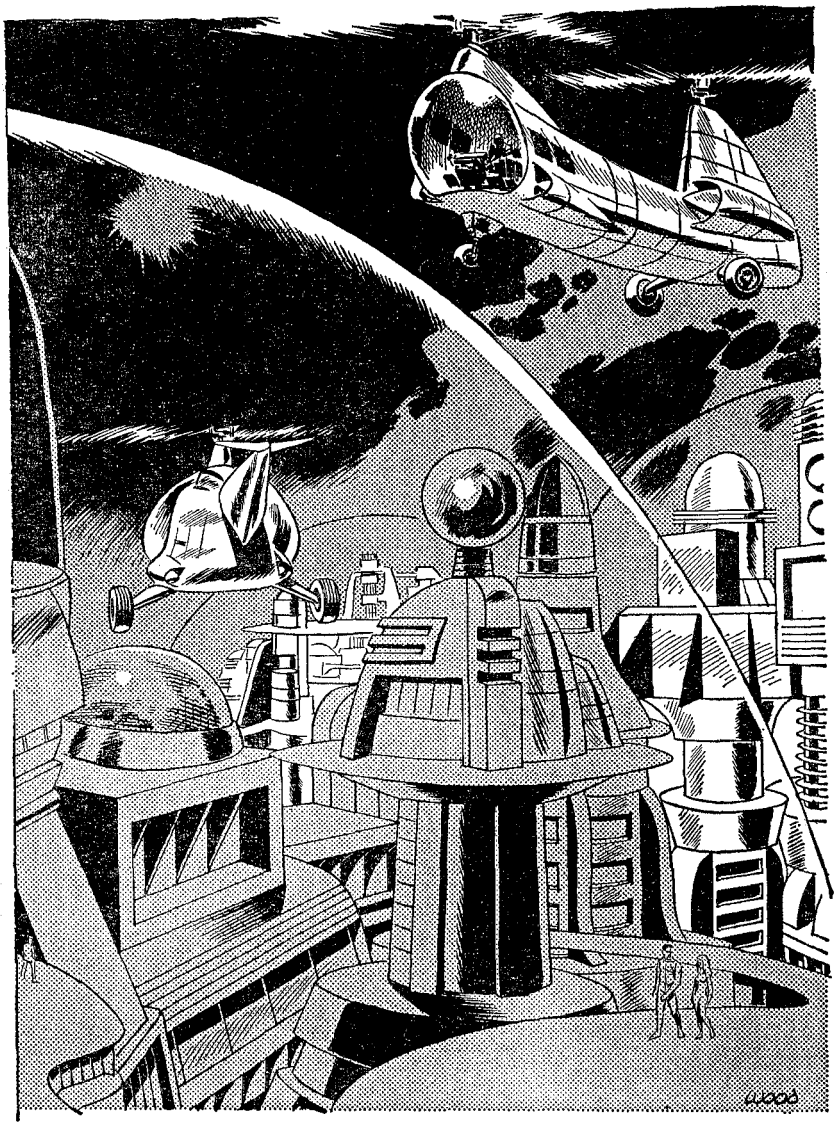

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which winds along one shoulder of the crystal palace ("this airborne sewer," one commentator called it), but providing that common conduit for the discharge of industrial wastes made it possible for Channelside industry to oppose the canopy. And today, the heat-borne waste elements are reclaimed by standard precipitation techniques in quantities sufficient to pay for the pension of the District's employees.

Once the poisoned air of industry was contained, control of the polluted water of the Ship Channel followed as just another technical problem. Certain Netherlands and Norwegian shipping companies which formerly refused cargo for or from Houston because the water of the Channel was so corrosive to hulls are now happy to bid on Mega-Houston shipping.

Since diesel and steam exhausts and the dumping of spent bunkers to form inflammable oil slicks are now all forbidden, vessels are brought up the Channel entirely by power supplied by the District at a price which is negligible compared to the expense of collisions in the old days. The power to move the ships was first supplied by electric tugs; but now comes from "magnetic mules" which grip the great ocean-going vessels in an invisible web and silently glide them up and down river, observing the rules of the road by electronic communication to each other. The electric tugs were built in Houston, since they existed nowhere else, and are now exported to many ports which have begun to attack their own pollution problems. The magnetic mules are another product of the ingenuity of an academic research group, in this case one from the University of Houston (UHuRanD Corp.), and their manufacture is one of a host of new industries summoned into being by the genie of the canopy.

The mere question of ingress and egress spawned the profitable light industry of canopy openings, those simple yet efficient machines sensitive to body heat, which expand to allow a person or a small animal to pass through and quietly close behind him. (They were originally called sphincters, but the biological analogy was a little too graphic for some imaginations.)

The water gates on the Channel represent another manufacture of Houston origin, useful wherever the volume of air to be controlled is too large for any device which actually opens and closes to accomplish the objective; and where the job to be

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done is of sufficient economic importance to warrant the expenditure of significant sums of money. The device, popularly known as "the electronic whirlpool," is a simple molecular sorter which creates a statistical anomaly of positively charged molecules of the major gases composing our atmosphere. The anomaly has its physical existence in an invisible wall (a local violation of the principle of entropy) about four feet thick. The warm, slightly contaminated air beyond the end of the semicylindrical glass shed does not push through this impalable barrier, and on the near side of it the silent, gliding, deep-sea vessels are within the conditioned air of Houston.

The electronic whirlpool is very expensive in terms of the power required to operate the machine, for refusing to accept entropy in a gas not contained in a closed volume is a never-ending process which does not even remotely approach stasis. Designing and manufacturing such entrances has become an enterprise as profitable as constructing monumental statues for public buildings once was. Since many airports, even in cities not themselves air-conditioned, are now domed (or roofed, as the municipal airport is at Wichita, Kansas), insubstantial entrances are in great demand. Various adaptations may also be seen at the several fields surrounding New Washington, and with particular success at San Francisco, where fog is no longer a problem because of the domed airport, and at Chicago, where even the shrieking winter lake winds are tamed by the electronic vortices.

The four aerodromes at the points of the compass around Houston demonstrate the different airport designs. At the private plane port to the west of MegaHouston, the dome is simply pierced by sixteen circular openings, in each of which a molecular sorter operates to keep cool, dry air in and hot, rainy air out.

The big cargo field has "trap-door" openings sufficiently wide and high to accommodate even the most immense of the knockdown cargo crates. The traps snap open at radar signals and when the cargo planes are twenty miles (one minute) out and already locked into their glide path. During the interval of slightly more than a minute that the upper and lower halves of the trap are opened into the dome, a simple forced-air curtain maintains the separation of inside and outside air.

This is only tolerable for cargo. Passengers require greater

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comfort and elegance than these glorified garage doors can give. The secondary advantage of the dome for cargo is that its height easily accepts — indeed, dwarfs — the cranes and gantries which disassemble the bodies of the flying crates into their constituent containers; and the virtual absence of weather inside makes it possible to store the containers in orderly annular dumps near the ring wall, so that a cargo plane can be stripped of its outer shell, reduced to the erector set skeleton, serviced, re-containerized, re-shelled and flown back out of Houston's Air Cargo Port in fifteen minutes. It is the boast of MegaHouston's freight solicitors, who are active in every cargo capital of the world, that delays in turn-around for a cargo plane occur only from waiting for the trucks to bring freight in, and never from handling.

The short-haul jet field dome has been equipped with openings that resemble giant camera shutters. They are triggered in the same way as the "garage doors" at the cargo port; but for the greater comfort of those inside the dome, a molecular sorter is in constant action behind each shutter, and there is no interchange of inside and outside air except for that which is inevitably dragged in during the instant when the little two-hundred-passenger needle noses disrupt the curtain.

At the long-haul jet dome, which must service the thousand-passenger global carriers which in appearance so resemble the boomerang, it has been found necessary to create a sort of storm door of air. The sorters are here modified to project a cylinder from the great openings through which the transports must land. The outer end of the transparent cylinder is disrupted by the passage of the enormous goose wings, but it is instantly re-established. The tubular walls bulge, but contain the outside air; and little enters the dome when the plane tears through the inner face.

Houston Hot Air Doors, Inc., one of the manufacturing arms of RicePro Co., Inc., stands ready to bid on the design and installation of these "doors" anywhere in the world; and the success of the company is evidenced by the fact that it trades in forty currencies.

Apologists for the new era are quick to point out that the most important thing about the doming of Houston has not been the comfort imparted by the process, but its generation of new industries, products and jobs. Aside from the fact that the original process, with its fits

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and starts and errors, soaked up unemployment of even the least skilled workers in the area for half a generation, the present form of the domed city has spawned innumerable new approaches to problems which once seemed insoluble or incapable even of being attacked.

Pneumatic public transport illustrates those specifically city-related industries which MegaHouston has developed. Connoisseurs of rapid intra-city transit claim that the network of vacuum tubes buried under MegaHouston is the fastest and most luxurious form of mass transport ever achieved and is of unparalleled safety, because both "cars" and "tubes" are of plastic sufficiently yielding to give with the shifting of Houston's soft subsoil, and the compressed air which fills most of the system at any one time serves to keep the whole thing blown up against soil pressure as if it were a serpentine balloon. Perhaps the distinguishing feature of the system is the flexibility which has allowed it to replace the auto for most purposes. (Even the so-called "exhaustless automobiles" are not used in the domes.) The pneumatic tubes branch to every single city block in MegaHouston. The constantly moving capsules are fully private, if desired. Parties wishing to travel together link elbows as they step onto the loaders, the auxiliary loops which accelerate one from standing still to a velocity matching that of the capsules. Once a capsule has expanded to accept a person or a group, it is impervious to any other passenger or to any hooligan or criminal until its load has been discharged.

And the school dome is now the only one which employs the first model of the modified tornado-making machines. In the rest of MegaHouston, the gentler, improved air-churns operate to move the masses of conditioned air so easily that the real motion is imperceptible. Children derive so much pleasure from the more palpable eddies in the school dome that they have been allowed to remain. The towering spirals also serve to introduce children early to their command of large technical forces and to the necessity of dealing with them in a technical and knowing fashion.

On exceedingly hot days, the spirals elongate to deal with the greater load imposed on them, and it is then possible to confide to the care of the smaller ones sheets of paper, light personal belongings and even textbooks on some days. Making them visible with colored calso-

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mine powder has fallen out of favor. Since they are double spirals, the objects tossed to them are carried up the center and then back down the outside helix as if by an invisible servant. The four largest ones will sometimes in midsummer, when they labor hardest, carry a child, if he is small; and there is great competition among the first graders to be lifted on the shoulders of the high schoolers and junior-college athletes to the point where the tornado touches down. To do this requires the making of a pyramid of at least three tiers, since the point of the spiral is never closer than fifteen feet to the ground; and the child who trusts himself to the whirlwind must also trust himself to his older comrades to hand him up the human slopes and at least give him to the air (and of course, to retrieve him at the return point of the outer helix). Valuable lessons in cooperation are learned without the children's ever becoming aware that anything is being taught. The newer machines are more efficient, but they will never have the charm of the first set.

The domed city is characterized also by extruded houses. Where the air does not corrode nor destructive wind destroy, fancy may be given full reign in a living shell; and the machines that deposit the shells will follow any model that is placed in the sensing chamber, much as a key-making machine copies the tumbler ridges of the original key. MegaHoustonians live in eggs, silos, n-sided polyhedrons, and in replicas of Monticello, Mount Vernon and Belle Reve. In and out of these pleasant homes, MegaHoustonians wear locally manufactured throw-away clothing. Where most dust is filtered from the air, paper shoes are as handsome as they are cheap.

There can be no doubt, however, that of the new industries germinating under the canopy like plants in a terrarium, the most revolutionary and the one which has had the most nearly world wide economic impact is the manufacture of soft plastic tankers for the petrochemical industry. The principle of the submarine tanker had taken drawing-board reality by the middle sixties. Once it was recognized that putting the whole ship underwater did away with all that superstructure of the traditional ship which required so much maintenance and the addition of the nuclear propulsion plant eliminated most of the space formerly occupied by diesel or electric motors, it was a short step to rationalize the whole operation by reducing the rigid

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structure of a tanker to a single module which required a crew of only four men. "Houston Tankers" are long cigars of clear plastic. Direct vision eliminates the need for gauging; and each section within the tubing has a valve on the side that is taken by a line coupling resembling the mechanical milkers which industrialized dairy farming in the middle of the twentieth century. The tanker is sailed into the specially constructed pens, and hydraulic pressure milks each section of its cargo. Loading is accomplished by first squeezing a section flat with the pressure of sea water, then pumping the water away from the side and letting the resultant low vacuum inside the section pull the cargo in from the tank farm. Ports not yet equipped with the special pens can use their shoreside pumping equipment. Each tanker carries short lines with a milker at one end and a conventional metal collar with a flange at the other for coupling to old fashioned pumping lines.

Need it be said that all this, which now seems to have been almost inevitable, in fact happened with many faltering missteps?

Before the master plan, it was thought that not all parts of the canopy needed to be domes. Under this impression, some extremely wasteful and impractical structures were created.

One of these resembled a great circus tent of clear, flexible plastic supported by aluminum girders anodized in bright primary colors. It enclosed a thirty-acre tract which was developed for quarter-acre house lots. The selling gimmick which doubled the lot prices was pressurized with an extra pound of straight oxygen, so that a slight euphoria was induced. The euphoria vanished, along with the promoter and the flimsy canopy, on Labor Day of 1974, when a tropical storm that had gathered her strength for three days between Yucatan and Galveston suddenly roared north and shredded the polyethylene film with hundred-mile winds. The domed structures survived almost without a leak, and the members of Old Houston's middle class who suddenly found themselves living in unairconditioned but expensive houses were thereafter among the most vociferous supporters of the idea that canopies ought to be built and maintained by some agency of society so that risks could be equitably shared by all citizens.

Clear polyethylene film continued to recommend itself because of its low initial cost. One design, hung pyramidally from

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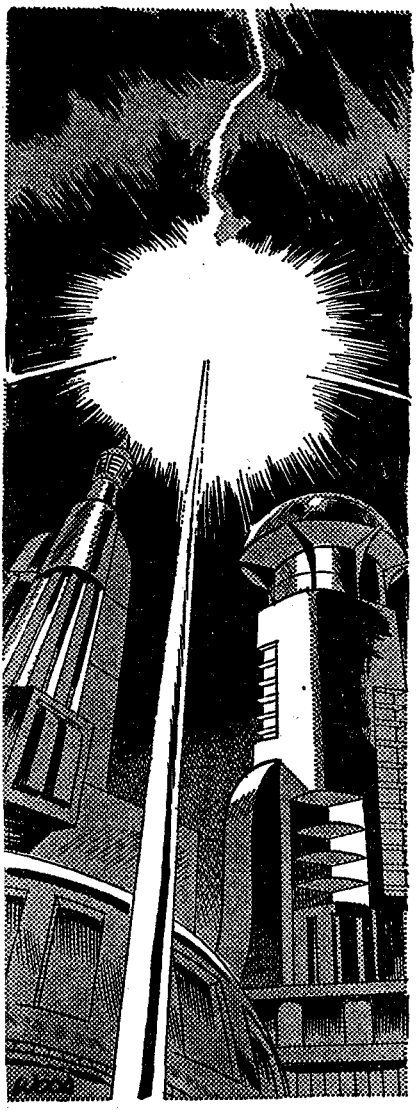

a single central mast, disappeared at the beginning of a week of rain when the mast was struck by lightning. A non-conducting metal was next used for the mast and the design modified to a cone; but something in the constant friction of the air moving within the cone charged the normally inert plastic film, and the cone called down a ball of lightning whose plasma flittered and yawed for half an hour over the apex and then lit the whole plastic sheet out of existence in the blink of a flash bulb.

The last trials of non-rigid plastics were made with simple inflated hemispheres. The pull and push of the coastal winds inexorably wore seams and fastenings to the breaking point, and the soft hemispheres were relegated to sports events and home shows. The expertise gained has proved, like so much else of the long experiment Houston has become, to be marketable. Since the inflated hemispheres are entirely practicable for short periods, the business of erecting and inflating them for athletic events has made bad-weather insurance a thing of the past for American promoters. A hemisphere, compressor and a crew can be hired for less than the premiums on such insurance.

Even the engineering failures

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served a purpose. Canopy building pulled in unskilled and unemployed workers as the living sponge pulls in food-laden seawater. Frantic urgency got dome raising into operation by every known building method, so it was no surprise to see one construction rising from a ring of bulldozers and giant earth movers and its neighbor employing eighty-year-old mule skinners to grade earth tossed up by pick-and-shovel gangs of fifty-year-olds who hadn't had steady work since the end of World War Two. Fortunately, Houston (and nearby Mexico) abounded with job bosses who had experienced this same amalgam of new and old as La Republica shouldered her way into the family of industrial nations. Much of this hasty work had to be redone. But before that happened, a generation of workers who had thought themselves discarded by society were given regular paychecks and self-respect, and the endless appetite of the project for better trained personnel created a pressure on the schools which made those old strongbacks the last generation of illiterate workers in Houston's history.

The largest factor in rebuilding was not, after all, the haste of the original construction, but the necessity for relocation and resizing of dome units to conform to the master plan laid down after the renamed Houston Harris County Ship Channel Navigation and Air Conditioning District became the only real governing body within the confines of Harris County.

When the empowering act of the Legislature of 1975 became law, the era of private canopy erection was over. The grid which underlies today's glittering complex of domes was laid down, and the first rational city of the industrial age came into institutional being. A wise discrimination had ever since balanced the demands of humanity and of technology in an equation which slights neither.

Anyone who has ever seen MegaHouston from the air or asked directions of the relaxed, technically oriented citizens who populate the great city has understood at once the functional simplicity and grandeur of the city's present design.

Harris County was divided first into four quadrants, with the intersection of the north-south and east-west axes placed, for sentiment's sake, at Texas Avenue and Main Street, where the capitol of the Republic of Texas once stood. There rises the grandest of the airy bubbles in which MegaHoustonians live and work, with Chairman Cromag-

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noli's transparent office at its very apex, the eagle's aerie from which all is visible. To the cardinal points of the compass, four lines of domes extend, their bases touching. Twenty-eight other points of the compass bear diamond bands of domes to the perimeter, each culminating in a large dome. The radii to the lesser points of the compass begin several miles from Dome One, on a circle with Texas and Main as its center.

Street curbs and sidewalks in each quadrant are of a distinctive color; so that directions to a home may begin by naming the quadrant of residence by direction or by color: "I live in the southeast (blue) quarter," and continue: "in the twenty-second dome on the south south by east point, finishing with the direction inside the residence dome: "on the west side of SSE 22, near the perimeter, block 62." Within the residence domes, there is no uniformity of streets, so the human desire to live "somewhere different" is given full play. Some of the "villages" have cobbled streets on which George Washington would feel at home, some are paved with poured plastic as shimmering and smooth as glass, and some have no streets, only walks. Fuel-celled ground-effect cars, floating on their cushions of air, are the only vehicular traffic allowed within the domes, and the constant vacuuming of the narrow streets and walks which goes on through the scarcely visible slots at the edges of every pavement prevents any dust from being raised by the cars. Internal combustion engines, whether they burn fuel oil or gasoline, are allowed only in the freight domes next to the airports and at the returning basin on the Channel.

The circular base of every dome in Harris County touches at least three other such bases. The consequence is that there are spaces between the domes. The intersecting arcs of the bases shape four, five and six-pointed stars on land which are outside the domes; and a wise decision has been to keep these enclaves not just green, but wild. It is possible to obtain a permit to cultivate an orchard, but it is rarely given, and the produce must be left on the trees for the use of the public and the wild animals (squirrel, possum, raccoon and armadillo, mostly) who have established themselves. The purple figs in the five point on the southwest curve of dome fourteen west southwest by west are justly famed; and there are several pecan groves made glad each fall by the disputations of small boys and squirrels over the

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nut crop. Perhaps the most delightful of the groves is that through which wanders one of the short, sluggish bayous. In the spring, it is made beautiful by the blossoms of the hard, tart, red peaches planted in Texas first by the Alabama Coushatta Indians; and in the fall, swatches of crimson betray the red haw, the fruit of which boils down to jelly of a flavor wild and indescribable except in terms of itself.

Hermann Park has been domed as an entity — zoo, golf course, bridle path, planetarium, Medical Center, equestrian statue of Sam Houston and all — but Memorial Park has been left as the greatest of the unroofed enclaves. There those who are nostalgic for the mosquitoes and midges of Houston's humid past may refresh their memories of the time before the canopy. Many do so. There is even an eccentric preacher who roams the park prophesying that MegaHouston will disappear in thunderbolts because it is the new Sodom, and calling on the "Xanadites" to repent while there is still time. He has about as much following as Lot had in Sodom.

The "Reeepent Man," as he is called, would not have been tolerated while the skeleton of the canopy was being fleshed out with plastic and air-conditioning, but MegaHouston is so incontrovertibly a wonder now that it can afford criticism from any quarter. The Houston Harris County Ship Channel Navigation and Air Conditioning District has been given the taxing and financing powers of an independent state. Chairman Cromagnoli, with twinkling ruthlessness, has moved from the school board to the District. He still calls himself a "Technical Democrat," as do most of his fellow citizens, even those who vote Republican in state and national elections.

The requirements of technology have so transcended Houston's past as a southern city, committed to the "peculiar institutions" of the Cotton Kingdom, that there is no longer any significant emotional content to old bigotries. MegaHoustonians have grown used to attacking problems on a technical level and so conscious that informally learned prejudice (whether against large bonded indebtedness, physical comfort or neighbors of a different culture) dissolves when problems are formulated in technical rather than in ethical terms, that even the oldsters approaching senility, who might have been expected still to have emotional responses as automatic as snap-open doors at a supermarket,

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can be heard declaring about some new idea, in their slow drawls, "Ye-a-ess, I *feel* like it's wrong; but let's talk about how we *could* do it, if we *wanted* to; and then let's cut back and see how we feel about it."

It is easy to look back now and see that the impulses to control the environment fully, which had its start in the modest, inexpensive Astrodome, created such technological demands that there was simply no profit in maintaining the old fictions. The raising of the canopy in its multiple domes became the overpowering concern in the life of every Houstonian, as in an earlier age the raising of Mont St. Michel and Notre Dame had been the overpowering concern in the lives of medieval Franks.

Houston's inhabitants had been sensitized to technology for three generations, from the day the first dredges began to cut out the Turning Basin between Navigation Boulevard and Six Bit Street. In three generations, the petroleum and chemical industries proliferated and upgraded their products. In their own lifetimes, many Old Houstonians saw natural gas grow from being a nuisance that was burned freely in the air to a profitable industrial fuel, and finally to a raw material of the plastics industry and even to a chemical component of food, in laboratory experiment. When this informal history was expanded by the importation of NASA's Manned Spacecraft Center, and technology was yo-yoing into space people you could run into on the street, the ground was fertile and the Harris County Domed Stadium was a viable seed.

The solution of Harris County's twentieth-century problems — urban sprawl, diluted government, dissipated tax base, air and water pollution, encysted poverty, black-white-and-bronze power — all lay at hand, in technical programs of varying complexity; but to call these programs into being required some central project that could seize men's minds and hearts as revolutions and revivals do. As the Xanadites of MegaHouston look up through the clean, clear bubbles that have made their city famous, they can be conscious that in Cromagnoli's Folly they have invented more than a few machines and a new way of doing something about the weather.

They have invented the politics of technology.

—H. H. Hollis

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THE BEING IN THE TANK

by TED THOMAS

Nothing very strange about the intruder, except that he lived where no human possibly could!

Douglas Cooper was a sour-faced man who was happy only when everything was going wrong. At the moment, he was worried sick. In all his years as General Production Manager of the world's largest hydrazine factory, he had never known such an extended period of time when everything ran perfectly. Each day he grew more worried, and he had finally reached the point where he jumped every time the phone rang. It rang now, and he snatched it up and almost shouted, "Cooper."

"Say, Chief — " he recognized the voice of Joe Beam, shift supervisor, whose shift was now running the great reactor — "you better step down here."

Cooper felt a great sense of relief sweep over him. Beam's voice was strained; he was obviously under great stress. Cooper said gently, "Why, Joe? What's the matter down there?"

"You better come down and see this for yourself, Chief."

"Sure, Joe, be right there. But give me an idea, will you? I want to start thinking about it."

There was a strangled gasp over the phone, then Beam cleared his throat and said, "Okay, Chief, think about this on the way down. There seems to be a man sitting in the hell hole, and he's talking to us."

Cooper nodded and smiled to himself. He did not ask Beam to repeat, because he knew he had heard him clearly. Cooper said gently, "All right, Joe. Be down in a few minutes," and he hung up and sat back and stretched

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and grinned at the ceiling. This was more like it. Now he had something to think about. Joe Beam, a bright and resourceful chemical engineer, had been working too hard and was having hallucinations. Now let's see.

Cooper stood up and walked out the door of his office, whistling. Maybe a rest was all that would be needed, or perhaps Beam had had a total breakdown. This would mean choosing a replacement, a study to see if the job were too demanding, oh, all sorts of complications. "Hello," he waved and sang out at the secretarial pool as he went by, and he slapped Sam High, the cashier, on the shoulder as he passed him and went down the hall, still whistling. The people he passed, looked nervously at one another, and Sam High rushed into the finance office and said, "My gawd, what's happened?"

"Why?"

"Doug Cooper just went by whistling, and he slapped me on the shoulder."

"Oh, brother, something's busted." And the phones began to hum.

Cooper turned into the Central Control room. A group of men stood in front of the reactor screen. The entire shift seemed to be there. They saw him enter and they moved aside to make room for him in front of the screen. But Cooper did not join them. He turned left and began to move down in front of the banks of instruments, checking all operations of the great plant.

The instruments indicated that the liquid air plant was functioning properly, and so were the distillation towers that separated the liquid nitrogen from the liquid air. Cooper moved on to the set that recorded the electrolysis of the dilute salt solution to make the hydrogen, and then he checked the functioning of the catalytic ammonia plant — the ten-story-high complex that compressed the nitrogen-hydrogen mixture and ultimately produced liquid ammonia. He pursed his lips and nodded his head and slowly walked on. He came to the bank that recorded the eighteen-step process for making the sodium-alumino-silicate catalyst for the hydrazine conversion. Normal. He continued walking, ignoring the impatient stares of the men grouped around the screen, checking the functioning of the heart of the entire operation, the hell hole. It was a vast chamber with great cascading beds of catalyst. It had a pure ammonia atmosphere maintained at zero degrees Centigrade. An intense flux of gam-

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ma ray irradiation poured through the chamber to supply the energy to drive the reactions. The hell hole was so complicated that Cooper spent three minutes glancing over the monitoring instruments. Temperatures, pressures, volumes, velocities, impurity content, concentrations, absorbtion coefficients and all other parameters seemed normal. He spent a moment checking the instruments monitoring the television circuit that showed the glowing interior of the hell hole. The TV camera caught the awe-inspiring scene through a series of reflections around lead-lined concrete walls, and even then had to be protected with thick, quartz windows. The TV camera had been the brainstorm of a public relations man. It was of no value whatsoever to the technical production people; their instruments gave them far more information than a view could do. But the PR man had seen its value to the touring public. And it certainly was a horrendous sight. The hell hole was without doubt the most vicious spot on the face of the Earth.

Cooper continued his rounds, checking the purification towers and the final hydrazine storage. Then, knowing everything was in order, he turned to the group at the screen and said, "Well, now. Let's see what has you fellows all excited."

He stepped to the space in front of the screen and looked at it. The men around him took a quick look at the screen to see that it remained the same, and then watched Cooper's face. They were disappointed.

Cooper looked at the screen that showed the deep interior of the hell hole. There, standing near one of the great waterfalls of tumbling catalyst, looking around at his environment with evident interest, was a man.

At least he looked enough like a man to be called a man. Cooper leaned closer to the screen, the better to inspect the man. The skin was knotty with tiny lumps that covered the entire body. The man wore a gleaming loin cloth and nothing else. There was no hair anywhere visible on his body, and the head was appreciably shorter than wide. There were slits on the head where the ears, eyes and mouth would normally go. There seemed to be no nose.

Joe Beam said, "An ammonia and hydrazine environment below zero plus a gamma photon dosage rate of better than 40 megarads per hour, and there he stands like he's admiring Niagara Falls. What is that thing?"

Kramer, Beam's chief assist-

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ant, spoke up. "Don't forget the pressure. That atmosphere in there is down to something like ten to the minus fifth millimeters of mercury. Why doesn't he explode?"

They all looked at Cooper, who for the first time broke into a broad smile. The smile worried them, for no one saw Cooper smile unless disaster was with him. Cooper said, "We seem to have a problem here. Now, in order to give us time to think about this, I don't want anyone to breath a word of this to . . . ."

The door to the control room burst open, and a short, portly man with a thick, black cigar in his hand strode in followed by seven or eight men and one very shapely blonde. The short man went to the screen saying, "Where is he? Where is this man in the hell hole I been hearing about? What do you . . . ?" He saw the creature on the screen and stopped talking. His mouth hung open, and he simply stared as his satellites crowded around. The portly man was the Honorable Charles Settler, Commissioner of the Hydrazine Complex, appointed by the President of the United States, with the advice and consent of the Senate, which was hardly ever withheld, but which should have been in this instance. Settler said, "How . . . how is that possible? Isn't it hard to breathe in there?"

There were choking noises from the chemical engineers in the room, and Beam said, "Yes, sir. In fact, nothing can live in there."

"Then how do you account for that man in there?"

"Well, we don't know yet, sir." One of Settler's satellites was whispering to Settler as Beam went on. "We have just started to consider the problems . . . ."

"Flying saucerman, that's what he is," said Settler, echoing what had just been whispered. "Flying saucerman, way over your heads here. Let's get some experts in here, find out about it." He waved his thick cigar at one of the men, who started to leave the room.

Cooper said, "Just a minute, before we go off half-cocked." Cooper had never been noted for his silken smoothness of speech. "Let's think about this for a few minutes. Let's not get the reporters excited about nothing."

"Nothing!" Settler almost exploded. "You want to suppress the greatest story of our time? You get out of here — " he pointed to his messenger — "and tell the newspapers, the TV, the radio and anybody I've missed. Then call the President and tell him what we have here and tell him I suggest he get right over. And also tell everybody that

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the technical management here wanted to suppress this great news, but that I insisted that our people be kept informed. Now, go."

"How did you find out about this, Commissioner?" asked Cooper.

"Oh, one of your people down here called me, as you should have done."

Cooper looked pointedly at Beam, who shrugged his shoulder slightly.

"Now," said Settler, "let us get ready for the press conference. I will do the talking. Do you all understand that?"

A deep voice boomed through the control room, "HELLO, THERE."

The newcomers in the room looked wildly around; it seemed to come from the walls. It was Beam, who located it. He pointed silently at the screen. The man in the hell hole was looking out right at them and waving a hand at them, a hand that had only three, thick fingers. The voice came again, "HELLO, THERE." The man was talking to them.

Settler waved back at the screen as if it were a two-way television system. The mouth slit of the man in the hell hole moved, and the deep voice again filled the room. "I come from far, far away, with message for your leader. Get him."

Settler took up the conversation. "Can you hear me?"

The warty man said, "I hear very well with my ers." And he pointed to his nose slits.

Settler grew excited. He turned to the group and said, "Get all this down. Make a recording. Dottie, are you getting this?" The shapely blonde shook her head numbly, and Settler said, "That's quite all right, my dear. Some of the rest of you, record this in some way." Men began scurrying around the room, and a few ran out. Settler turned back and said to the man, "Are you comfortable in there? What are you wearing?"

The man touched his breechclout and said, "An iron alloy you do not know about. But I will tell you about it after I give my message to your leader. Get him."

Settler began explaining about the President of the United States. Cooper unobtrusively backed out of the group and began prowling around the control room, looking at the gauges again. He rubbed his chin. The next time the deep voice came, Cooper placed his hands against a wall and began moving. Beam came over and said, "What is it, Chief?"

Cooper did not answer but

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kept feeling the wall. Finally he said to Beam, pointing to a spot on the wall, "It's coming out from behind here. Feel it."

Beam gently placed his hands on the wall and felt the very strong vibrations everytime the warty man spoke. They were strongest at the place Cooper had found. Beam said, "A transducer behind it somewhere."

Cooper said, "Maybe. Have you noticed that the yield has not fallen off the slightest?"

Beam was puzzled. He glanced at the G-value gauge for hydrazine, and it flittered around the one hundred per cent mark. He looked at Cooper, but Cooper was looking around the great control room, chuckling to himself, rubbing his chin. Settler's shrill voice echoed through the gentle hum that normally filled the room, and the deep voice of the warty man continued to vibrate in the walls. The chemical engineers that ran the operation noticed that Beam and Cooper were not paying attention to the conversation between Settler and the warty man in the hell hole. They nudged one another and drifted over to join Cooper as he prowled the control room. Bill Helm, the most junior of the engineers, said to Cooper, "Pretty soon this place will be a madhouse, sir. Shouldn't we make plans for handling the reporters? And even the President himself will be here. I hate to think of disrupting the operation."

Cooper stopped and seemed to become aware that his people were around him. He said, "Oh, good, two of you stay here. Beam, you and the rest come with me." He started to leave the control room, the rest of them following behind him, when a noisy group of men burst in through the door and swept them back into the room. It was a group of reporters, and they were followed by a TV camera crew and their equipment.

The control room quickly took on the aspect of a fight arena. Men jostled for a position in front of the monitor screen while the camera crews screamed at them to get out of the way, and the deep voice of the warty man continued to rock the room. Cooper and his group tried to bring quiet so the communications network for controlling the process could continue to be used. Cooper finally got their attention by shutting off the screen entirely. He assigned positions to the crowd and when Settler tried to take over the position assignment, Cooper happily informed him that he was jeopardizing the entire hydrazine operation.

"Mister Cooper," said Settler.

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"Need I remind you that I am ultimately in charge here?"

"No, Commissioner. But I would like to avoid a disastrous explosion here that might level a fair portion of the surrounding county. However, if you are not concerned, you go right ahead."

There was a total silence in the room until Settler shook off his stunned look and said, "Well." He coughed a little. "You tell us where you want us to stand, Mr. Cooper." The reporters and cameramen nodded agreement.

Cooper left three of his men to see that order was maintained as much as possible in the mounting bedlam. Cooper stepped out into the corridor, turned away from the elevator and went into the seldom used stairway that led down into the lower regions of the main building. It was quiet there, and Cooper hummed happily as he went down the steps one at a time. At the lower level he stopped and said to no one in particular. "Let's see, now. The wiring from the TV pickup in the hell hole runs to the amplifier, modulator and all that other stuff in a room down here somewhere. Anybody remember which one?"

Bill Helm said, "Why yes. They showed it to us during orientation last month. I'll show you." He led them down to another level, turned right and finally came to a door marked "TRANSMITTER."

Cooper hauled a bunch of keys from his pocket, selected one, and opened the door and went in. The others followed, not knowing what they expected to find. There was nothing inside except a mass of equipment the size of two filing cabinets. Cooper ignored it. He walked around the walls of the room, staring at them closely, and came back to where he started. He said, "Don't just stand there. Look around in here for some extra wires running out of the room. You men with young eyes, look sharp."

They scattered, and in five seconds Helm had found them. Five wires in a cluster left the main bundle and ran up a corner of the room beneath a thin layer of mortar. Helm's quick eye had spotted the lack of a sharp angle in that particular corner.

Cooper pried away some of the mortar to establish the fact that the bulge was a series of wires. He grinned at the wires and said, "Now, we trace them to see where they go." He pointed to the ceiling where the wires went through and said, "They lead into that conduit running parallel to the corridor, I imagine. Let's

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just follow them." They went out into the corridor. Cooper sent one man in each direction with instructions to look in at the first access opening to see which direction the wires went.

Again it was young Helm who called back from twenty yards down the corridor, "Here they are."

Before starting in that direction, Cooper said to the man down the corridor in the opposite direction, "See them?"

"No, sir."

"Good. Let's go." He set out down the corridor, whistling again, keeping time as he stepped along, whistling the Colonel Bogey March. The others fell in step.

At every access opening Helm stuck his head in and announced, "Yep, they're there," and on they went, in step. The time came when Helm said, "Wait a minute. They're not here. I'll see where they went." He crawled into the conduit and disappeared for a few seconds before his voice came back. "They go through the wall, away from the corridor." He crawled back out.

Cooper pursed his lips and thought. "Two possible places. Another room off the other corridor, or the corresponding room down below it. Let's go." He did not whistle this time, just smiled and walked faster. His group strung out behind him as he turned a corner, found another locked door, pulled his keys out and opened it. It contained a set of auxilliary vacuum pumps, looming quietly in the gray room. He backed out and said, "Well, that leaves the other one downstairs. That's all that's left. I wonder what's showing on the screen about now?"

Bright, young Helm said, "There's a monitor in the Catalyst Dehydration Control Room, one flight above."

"Let's look," said Cooper, and he walked off, moving very fast now. He climbed the stairs two at a time, went down the corridor and into Catalyst Dehydration Control, and joined seven men watching the screen. The warty man was holding forth.

"When you have your leader, I will give you the message from my leader. Where is he? I can't stay here forever; it is uncomfortable. Where's your leader?"

None of those in Catalyst Dehydration could hear Settler answering upstairs, but they knew he was talking loud and fast. The warty man was listening and obviously growing impatient, and then he said, "Very well. I can wait another ten minutes. Then I must give you my message and go on my way. But hurry."

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Cooper said, "Well, I guess that means the President is almost here. Too bad." He went out, and his group followed.

In the corridor Helm said, tentatively, "Uh, sir. What is it you think? What's happening?"

Cooper seemed not to hear, at first, but then he turned his head and smiled at Helm and at Beam and said, "Well, now. You heard the man in the hell hole say that he was wearing an iron alloy breechclout?"

They nodded and waited, but Cooper went down the corridor to the stairs and started down them. Beam said, "What about it, Doug?"

Cooper said, "Look. You know what iron does to the hydrazine process. It's poison. Yields fall off when even traces of iron are present. But you saw the yields. They were right up where they should be. So there was no iron at all present in the hell hole." He headed down to the lowest level.

Beam said, "But he said it was a special alloy of iron. It might not release any iron ion. Then the yield would stay high anyway."

They went out the door into the corridor at the lowest level. Cooper said, "Funny about that. I was willing to accept a man — a man from another planet — being able to live there. I could accept the fact that his skin would resist conditions in the hell hole, incredible as it seems. I would accept that he can breathe that atmosphere — that he can withstand the radiation — that he can talk to us and hear us. On all things I am willing to suspend disbelief because I simply do not know. But iron and iron alloys I know. I do not believe there is such a thing as an iron alloy that won't break down a little under hell hole conditions. And if you grant me that, then the whole thing falls apart. Like this. The yield is up, so there is no iron in the hole, then old warts isn't in the hell hole. No iron in the hell hell hole either. If he isn't in the hell hole, where is he? Well, he must have tapped into our TV system somehow and is superimposing his image on the actual image from the hell hole. Where is he? I think he's right in there."

They stopped in front of the door, and Cooper gently tried it. It was locked. He took out his keys and quietly unlocked the door and eased it open a few inches. A voice came out from the room, " . . . impatient. So you had better get your leader immediately. I am getting tired." The room was brightly lighted, and there were three men there, one of them the man in the hell

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hole, facing a TV camera. There was a neutral gray backdrop behind him, and he walked up and down in front of it as he talked.

Cooper threw open the door and walked over to the man, tapped him on the shoulder and said, "All right, warty. The party's over. Suppose you come on upstairs and tell us what this is all about."

The effect on the main screen in Central Contral was devastating. On the screen it looked as if Cooper had suddenly appeared in the hell hole and tapped the warty man on the shoulder and started talking to him there. There was a moment's slack-jawed silence, and then a roar went up, a roar that was echoed in front of 80 million TV sets around the country, and 20 million abroad. The warty man turned away from Cooper, but Cooper caught him by an arm and spun him back and said, "Let's go, warty. Upstairs." And he shoved him out the door. The others helped half-drag him and his cohorts to the elevator and up to Central Control. The Seret Service had arrived by that time, and they quickly surrounded the warty man and his two friends. Settler stepped forward and started to be indignant, but a newsman turned on him and snapped at him, "Why don't you shut up for awhile so we can find out what's happening." He looked at Cooper and said, "Will you ask the obvious questions?"

The warty man was peeling off his makeup, apparently glad to be out of it. He was a brown-haired, blue-eyed man with a hooked nose and a jutting jaw, once the mask was off. He sighed and smiled and said, "Now, don't get excited. We just wanted to put in a plug for the other hydrazine process."

Cooper said, "You mean the Rashig process? That's not as good as this one." He waved at the instruments that were around them.

"It is with the improvements my client has made, but nobody would listen. Well, we found a way to make you listen. Almost. As soon as we knew your President was watching I was going to tell him to build your future plants to handle the improved Rashig process, and then I was going to disappear. That's all there is to it."

Settler sputtered, "I'll see you in jail, you and your clients. I'll . . . "

"Knock it off," said the newsman. "You played right into his hands. The one we owe thanks to is Mr. Cooper."

Cooper did not answer. There was something about what the warty man had said. Cooper

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stared at the warty man's hands. "Interesting," said Cooper. "You had three fingers in that costume you wore. Now you've removed the costume and you have four fingers. Why is that?"

The warty man started to move, but Cooper grabbed him and called to the other Secret Service men, "Hold them, boys. We're not done yet." While the others held the warty man and his two friends, Cooper stepped back carefully and looked at their captive. Then he stepped forward again with a broad smile on his face and fiddled with the warty's man ear.

The ear came off in his hand, and Cooper carefully stripped away the second face mask. Underneath, the skin was yellow, like the skin of a banana, with a purple mottling. Even the torso turned out to be masked, and when it was exposed, the real torso was bony and flat, like the wing of a bat. When the warty man was finally peeled down, he was six feet tall, a foot wide, and two inches thick. The people in the room looked at him with horror.

Cooper took a thin tube from a belt around the creature's middle, pointed it at a corner of the room, and touched a button on the end. The thin purple beam burned a tiny hole in the wall. Cooper grinned and said to the creature, "What did you have in mind? Kill somebody?" He snapped his fingers. "Assassination of the President?"

The creature snarled and twisted in the grip of the men who held it, but they were much stronger than it was. Cooper looked at the other two men. He twisted the ear of one of them, and it came off in his hand. Cooper said, "Looks like an invasion of some kind going on. Somebody take charge and get an investigation going. There may be more of these around."

Settler recovered his voice. "Well, I'll certainly continue to investigate this situation. And I want to say I am very glad to have caught them."

"Aw, shut up," said the same newsman. "You didn't do a damn thing except act stupid the whole time. If it weren't for Mr. Cooper here, we never would have . . . Where is Mr. Cooper?"

Cooper was over at the other side of the control room, looking at the needle that showed the hydrazine yield. It hovered around the one hundred per cent mark. Cooper had a worried look on his face, and he was muttering, "I don't like it, don't like it at all. Something's bound to go wrong."

—TED THOMAS

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HIDE AND SEEK

by LINDA MARLOWE

Any child could play this game.
But tragically few could win it!

"Last one round my base is it!" With that Michael took off down the path, the trees on either side growing dimmer in the fading light. They hung over the path, obscuring the last of the late afternoon sun.

From the barn to the Senior Citizens Settlement. They could hide anywhere between the two points.

As he went down the path, avoiding sticks and anything that crackled, his mother watched him from the porch. She was knitting — and rocking. But he knew she was watching and squinting, even though it was getting dark. Her glasses were probably on the parlor table. She was watching.

As the little figure moved farther away along the path, she thanked God that her older boy, Steven, was sitting in the parlor, catching the last of the light — doing his studies. She hated hide and go seek now as she had hated it as a child. That feeling of waiting to be caught. Every noise might be "it." Maybe part of her was sticking out from behind the bush where she crouched. That wild dash for home, with her heart pounding in her throat. She hated it still.

But she didn't have to play

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any more. She could sit on the cool porch in the early evening, and knit and rock. She wondered what her mother was doing at the Home. Probably sitting and rocking too. "Sardines," she thought. "There was a game." You weren't alone. Another child, a friend, could hide with you. You could lie flat in the ditch, with the warm body of a friend next to you, hand holding yours in the darkness. When another came hurtling in the hiding place, you were all sardines together. You weren't alone, not like you were in hide and seek.

Michael was halfway down the path, and he hadn't even seen a glimpse of another jacket or sweater. They must be hiding in the woods. But only to the old stone fence; on the other side of the fence ran the busy highway, and they weren't allowed to cross that. One time his dog had tried. They had found his body on the side of the road. Hundreds of cars went by so fast, like a river, never stopping, the drivers looking neither to right nor left. He darted off to the side of the path and suddenly heard footsteps running behind him.

Turning quickly, he saw Peter running for dear life toward the old tree. It was too late to catch him, yet his feet started running back to home base. "Home free!" shouted Peter and threw himself on the ground beneath the tree, winded and happy. But carefully, one hand was laid on the trunk of the old oak. He was home free, and he wanted Michael to see it.

On the porch, Michael's mother sighed, and was happy for Pete's mother. He was such a good-looking active boy. The kind any mother could be proud of, given half a chance. Maybe he wasn't so smart in school — but then, then, there are other things. She could hear the sounds of her older boy turning the pages of his book in the other room.

She shook her head, Out of her four boys, she had only the one student. A guaranteed future for him. He understood the formula, the intricate theories, even his teachers had come to call on her, telling her of his brilliance. "Well, at least I don't have to worry about him. He'll be all right. Just Steven and Michael now . . . . Please, Michael," she whispered to herself, "find someone before night comes."

He was standing forlornly beneath the tree, looking down at his friend. One home free. That left three more.

He decided to circle the tree, but still stay within range of running home. It was getting harder to see. The trees were just

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standing shapes, black and gray and white.

She wondered if *her* mother had sat here and worried about her. "We're so worried about the older folk, nowadays," she thought. There had been a big battle about it when she was younger. The country had worried about what to do with the population over fifty, they seemed to be taking up more and more space, and becoming less useful. The world had been geared to the young people in those days. Her own father had been one of the scientists to find this solution.

At least her older boy was safe. He was following in his grandfather's footsteps. One of those mathematical minds that is passed down from father to son, to son.

Michael circled the big tree again, moving further into the forest. He thought he caught a glimpse of Jim's red sweater.

But Jim was twelve and had played before. He jumped neatly over broken boughs and stumps, reached the tree seconds before Michael, and placed his hand against the trunk. "I'm free," he yelled, and Michael crumpled in a heap next to the tree, gasping, too late.

Only two left. The Marble twins. She knew their mother was waiting at the Home. Everyone around here had a relative in the Home. A mother or father, or even an uncle. She thought of the old folks — sitting and rocking in the Home, safe and secure in the love of their children.

Why not the old people? Why not let them play hide and seek and see how they liked it? She had argued long and hotly about it, but people had just called her an emotional mother. Wasn't it easier, before you got too attached to them — before they became something . . .

Michael crept on all fours now, moving silently from tree to tree. One last ray of sun caught the glint from the knife in his hand. Why couldn't he have been the smart one? My baby, she thought. He just likes to look at things, trees and grass and the stream. She remembered the time he had come home from a walk flushed and happy, a bunch of wilting spring flowers in his fist.

She could see where he was by the way the tall grass moved. Suddenly, the two twins bobbed up, their heads bright in the moving grass. They started for the big tree, the smaller one, David, tripping over a root. She stood up, one hand clenched white against the railing. The other twin grabbed for his brother's hand, and then just turned and ran.

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Michael saw him lying there, and raised the sharpened knife, bringing it down expertly in the boy's heart.

"He's safe," Michael's mother whispered. "Safe for another year." They would practice even more in the coming year. She would sharpen his eyesight, practice going into the fields and hiding. Next year, he wouldn't be "it"; he would be one of the hiders. She wondered who was left in the next village. There were supposed to be only four children to a farm community. Her sister's son was a brave one, a smart one; she hoped he was safe, too. She sat back in the chair, sighing with relief.

There would be bigger portions tonight, and all year.

All the families would be having an extra portion, now that one of the Marble twins was gone. If only he had gotten both of them, they might have had some bread, too . . .

But there was always next year. Michael would be bigger and stronger, his chances would be even better. That's all now, Michael.

"Allee, Allee in free," she called.

—LINDA MARLOWE

FORECAST

The October issue of *Galaxy*, as it happens, marks our seventeenth anniversary in the business of peering into the future. Seventeen isn't a particularly exciting birthday; but its a pretty respectable age for a science-fiction magazine, and we're going to mark it with small-scale celebration.

For one thing, we're going to have our Founding Editor, H. L. Gold, join us with a long novelette called *The Transmogrification of Wamba's Revenge* — after all, he started the whole thing in October, 1950. Then we have a short novel by Roger Zelazny (his thirteenth anniversary as a writer, since his first story was published in October, 1954; the name is *Damnation Alley*, and it's a fine one. Another fine one is the novelette *Understanding*, by George O. Smith (first published in October, 1942, which makes this his 25th anniversary in the field); and, with a little luck, we'll have a piece by the present editor, namely Frederik Pohl. It's his 30th anniversary (first published in a professional magazine in October, 1937); the reason luck is involved is that he cracked his wrist in a car smash a few weeks ago, and it isn't yet sure that he'll be in story-typing condition soon enough to get his contribution ready for the deadline. (But he's a friend of the management, after all, and maybe we can stretch it a day or two . . .)

There'll be more, of course. Join us and see!

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Galaxy Bookshelf

by ALGIS BUDRYS

Three Stories by Murray Leinster, Jack Williamson and John Wyndham, selected and with an introduction by Sam Moskowitz (Doubleday, $3.95), is a book you should have. It has a lot going for it, not the least part of which is a high quality of entertainment. Being a Moskowitz book, it also has a purpose in life. This purpose is expressed in a ponderous, opaque introduction, and my hat is off to the Doubleday people who had to treat with its pachydermatous prose. Treat with it they did, however, and furthermore boiled down its message to one short quote on the back of the jacket:

" . . . It is hoped that" [these stories'] "examples may make a significant enough impression so as to bring about not a substitution of this type of story for what is written today, but an *incorporation* of the elements they contain into the mainstream body of modern science fiction."

Sam has done a daring thing. He has taken three previously unreprinted long novelettes of the early 1930's and offered them to the science-fiction world as examples of literature displaying the "sense of wonder" he speaks of so often. It would have been very easy for him to fall on his nose; they weren't writing any more good stuff then than they are today.

The three stories are Leinster's "The Mole Pirate," Williamson's "The Moon Era," and Wyndham's "Exiles on Asperus." Two of them are excellent; "Exiles" is a little less than that. All three convey a sense of immediacy and adventure, and a feeling that the universe is widely wonderful. None contain any egregious archaisms of dialogue or narrative.

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"The Mole Pirate" makes use of a rare and always entertaining idea; that matter can be made interpenetrable, and that this capability would permit what Leinster calls "earth planes" — vehicles travelling through the solid substance of the earth. Around this idea, made manifest in this story by a prototype burrowing machine, Leinster works a chase story. His scientist-villain, Durran, steals the Mole and begins interpenetrating bank vaults until stopped by the scientist-hero, Jack Hill.

Hill, from whom the Mole was originally stolen, uses the course of the story to make fresh engineering discoveries — all smoothly forced on him by the plot of events — which lead the reader through a series of literally amazing, astounding and astonishing scenes full of wonder. My favorite is the one in which Hill, marooned as an insubstantial ghost, must walk for his life over what is to him a quicksand earth, on immaterial snowshoes.

This is good stuff. It combines the feeling of shared discovery with a sense of "Of course — this is exactly how it would be for me!" Just so, "The Moon Era" is about as close as one could get, I think, to being picked up in fact and transported to an alien world. You can see, smell and taste the jungly, mossy Moon of the geologic past into which the hero is swept in his supposed antigravity car.

The Moon on which the hero lands — after the car turns out to also be a time machine — does have no logical connection with the Luna of contemporary reality. On the other hand, there is no particular reason for Williamson to have set the story in the same place by a different name. It is an exotic locale, described in beautifully dovetailed detail, all of a piece. There the hero encounters marvelous beasts, a comfortingly benign alien entity and pain, horror and destruction, as well as nobility. The being — furry, golden, like a snake with a woman's eyes and mouth — would have been impossible for any modern science-fiction writer to create. If he had, the hero would have made love to it.

These two stories have the common factor of showing the reader a believable technological idea at the outset, and then going on to involve their characters in the logical technological consequences. They also share a spirit of rational nobility which has been quite lost from most popular fiction (and which may have more to do with the sense of wonder than one might at first suppose). That this complex of effects is hard to accomplish is demonstrated by the Wyndham,

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which shares the spirit but not the engineer's *geist*.

Though it is a good story to read — that is, is preferable to the average reading experience in the field — it says that conditioning is possible but deconditioning isn't, and it gets its heros and villains into motion by piling coincidence upon coincidence. Thus Wyndham, who was still John Beynon Harris when this first ran, and twenty years away from his pleasurable Wellsian novels of the 1950's, away faltered both ways. He did not know his science as well as his two contemporaries knew theirs, and he didn't know as much about commercial plotting, either. In fact, he reads a great deal like a young writer of the 1950's trying to imitate his successful contemporaries. What is best about this story today is where Gernsback would have said it was weakest in its time.

I'll happily testify that the "sense of wonder" will operate in the absence of nostalgia, for I hadn't read any of these stories before, and I felt the effect as I'm sure most readers will. Now the question is, what has been proven? What has been passed on to the body of research into how science fiction should be?

That's not so easy to assess. I've always thought that the feeling technology was the Answer prevailed in the '30's, and conveyed a certain boundless optimism into science fiction. And perhaps I thought rightly. But two of these stories are tragic — specifically tragic because of technology — and the third specifically says the tool takes its morality from its wielder, not vice versa.

So, I don't know. Perhaps it does have something to do with that specific sense for a certain kind of nobility.

Well, in any event, someone is sure to pop up with the observation that Sam was selecting his evidence — as if every anthologist doesn't do that — and we'll all be able to go back to sleep again. Which might be all right with me, seeing as how Sam *roars* so.

Philip E. High, author of *Reality Forbidden* (Ace), has taken a technological idea and involved his hero in its consequences, and furthermore has enough talent to have made the process interesting.

The central idea here is the "wish machine" — a brain stimulator so simple to make that it begins to tear down civilization as a consequence of its offering the perfect satisfaction with little investment. Popping up all over the world, these devices are soon the object of death struggles be-

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tween industry and government, criminal elements and the law. Nor are matters helped when the addicts are able to make the "Susceptible" portion of the populace (the vast majority) share their delusions. Soon enough, confirmed addicts are effectively protecting themselves from non-using Susceptibles with all manner of fantastic devices and beings. Only the robots and Immunes can capture them and destroy their machines. Addicts are roasted to death for the general edification of the populace, which takes a sadomasochistic delight in having these convenient scapegoats for its necessary regimentation and deprivation.

Gilliad, the Susceptible hero, and Kendal, his Immune companion, are sent by England to explore Canada, generations after the original fragmentation of the world's metropolitan areas into armed camps. There they encounter a culture founded on acceptance of the machine. Gilliad soon is brought to realize that the Immunes, Kendal included, are the ruthless masters of the world.

Sound reasonable so far? Reasonably specific electrostimulation of the brain produces other predictable results today, after all, and High's extrapolation from this fact is none too wild.

Too, he can write reasonably, matter-of-factly, sometimes with great success in his objectives, as when he handles the successful invasion of the remaining Immune strongholds by the armies of the Canadian Susceptibles, and describes the ultimate disposition of the master Immune, Eugene Welt.

But larded in through this are such assertions as that Gilliad is one of the rare Susceptible/Immunes (and thus has the best of both worlds). He meets the Frozen Virgin sex symbol — in this case a fellow S/I who happens to be the girl all the other virile fellows lust for — and Awakens her. Welt got the first wish machine from an alien information machine, which then camps on a hill and waits for Gilliad to come along hundreds of years later and ask it how to destroy Welt. Gilliad, who knew nothing of the technology or social situation in Canada on Page 28, is discussing both, fluently and analytically, by Page 32, and is astonishing the Canadians with his brilliance not ten pages later. He comes on so Van Ghodish strong that High feels compelled to insert a conversation "explaining" this fresh-et of precocity.

What are these trappings that make a taut, reasonably attractive story a hunk of cheese? The sounds of a writer piling wonder on wonder, senselessly. So, obviously, one of our critical needs

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now is for a definition of "wonder."

Wonder might well abound in Poul Anderson's *World Without Stars,* (Ace), the story of a party of men marooned in a solar system far beyond the galactic lens. Their ship is a wreck, yielding little of survival value (perhaps because there really *has* been some progress in the craft of writing since Daniel Defoe's day). Their planet is deficient in metals. Their food is low. They can hardly see in the dim light and the mists. And the natives are restless.

The archetype — at any rate, my favorite archetype — of this sort of story is John W. Campbell's *The Moon is Hell.* That book is roughly contemporaneous with Moskowitz's three picks, and in it a party of Earthmen is stranded on the far side of the Moon with no food, no water, no shelter and no air. By the time the tale is nine-tenths finished, they are not only living like gluttonous kings and have revolutionized large chunks of contemporary technology, they have murals around their swimming pool. After that, they have a little more trouble — they nearly die of malnutrition amidst this sybaritic splendor — but all this is only to the good, for it provides a fitting climax to the plot, whose entire burden is the technological one, and whose prevailing effect makes it seem quite credible that every squad of engineers ever sent into the howling wilderness wants nothing so much as to found its own YMCA.

World Without Stars is a book by a writer every bit as versed in the physical sciences as JWC, Jr. In fact, if there is a lineal inheritor of the pre-Stuart Campbellian mantle, Anderson is your bonnie prince, when that mood is on him. Like Campbell, he can also be a poet, sustaining that same emotional high whine of a style that played with such devastating effect on the readers of Stuart after John's chrysalis broke.

Now, the thing is that, to my mind, *The Moon is Hell* and *Twilight* are both masterpieces, as is *Who Goes There?,* and each of them is an entirely different kind of masterpiece from the others. It's when you get blends of these various spirits that, again to my mind, a certain sharp edge is lost, as it is, to my mind, in *Blindness.*

Okay. Now, *World Without Stars* begins with the story of the marooned adventurers, who immediately set about applying engineering solutions to their problems. But their problems are multiplied — by the need for military and diplomatic adven-

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turers vis-a-vis the natives, whose storyline eventualy takes over the narrative and swamps the original problem, and by the need to cope with the defection of one of their members. He is a victim of deconditioning, and is fallow ground for redirection by a native alien race so ancient that it can remember what amount to evolutionary effects.

This is High's piling-on of wonders, though done by a man very well qualified to do so and weave it all together with deceptive ease. But the greatest of these is immortality, which requires the periodic deconditioning that went too far in one case and, which permits Hugh Valland, the balladeer/competent, to be thousands of years old. Valland has been utterly faithful all that time to his Mary, back on far distant Earth. It's Valland's drive to get back to his Mary — or, as I think you would guess quite soon in reading the book, Valland's drive to be true to the ideal of Mary and himself — that motivates and sustains the castaways' 40-year effort to get back to civilization.

We are never shown most of this, for the story that began by being the story of a shipwreck ends with the castaways' military success in the first year of their imprisonment. It's just as well not to have dragged us through it, when everything important has either already happened or won't happen for another forty years, but much of the book's beginning *says* it's going to be about the solution to an engineering problem.

Second, it turns out that what this story is about is celibate dedication *sans peur* and *sans rapproche*.

That is, indeed, a species of nobility. But of all the things this book contains in admirable quantities, to offset some of its routine defects of plot, it lacks the one thing above all. Of sense of wonder, there is none. There's much to arouse admiration, and plenty of tension, education — say, maybe the thing I'm groping for is the lack or presence of something that would inspire emulation.

So it would seem we also have to find the right kind of nobility.

Four for Tomorrow (Ace) collects four Zelazny novelettes — almost *the* four novelettes of Roger Zelazny, and provides them with an introduction by Theodore Sturgeon, who is as fond of Zelazny's writing as I am, but much more articulate at explaining why.

These stories are "The Furies," "The Graveyard Heart," "The Doors of His Face, the Lamps of His Mouth" and "A Rose for Ec-

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clesiastes." Henry Kuttner could have written the first, and he and C. L. Moore, the second. The third is within Theodore Sturgeon's range, and the fourth might have been by Ray Bradbury and Avram Davidson, if Phil Farmer had helped and Yeats, I guess, had done the poetry. (I flunked English Lit. — pay it no mind). Actually, the influence of Sturgeon is visible on "The Furies," as well, and I don't really feature anyone but Zelazny doing "Rose" — you'd never get all those other people in the same room.

But you have the idea; this man is beginning where other famous people have arrived. There hasn't been a phenomenon very much like him since Stanley Weinbaum. It's true, for example, that "Rose" has no figure in it to compare with Williamson's Mother in "The Moon Era," but on the other hand there's more of a resolution to "Rose." Corgo, in "The Furies," is not exactly akin to the batrachs' Second Generation in "Exiles on Asperus," and yet, he is. Also, his relationship with the Drillen is much like that of Stephen Conway and the Mother, and he is the mirror-image of James Durran. He has that nobility which Durran deliberately renounced, and which Gallinger gropes for in "Rose." And why does Albion Moore sleep, in "The Graveyard Heart," if not to secretly hope that somehow, in some marvelous way, he will awaken to find he is not only noble again, he doesn't have to remember all the things he did to cancel out experience?

What I'm saying, I suspect, is that a good story is a good story, and a good writer writes good. Maybe today it takes a great writer to know as much about what's important to Man as the good writers knew in 1930. But so many other things have happened since then, too, and I suspect that if it takes someone like Zelazny to touch on something that was a matter of course a generation ago, then the swoops and swirls of history have put an awful bend in the mainstream, and pushed the whole flow in either the opposite direction or at least one 'way off to one side. Hell, looking around me at many other things in this world, I'd have to go along with that by observation, never mind ratiocinating about it.

It's a tough world. It only runs in one direction. Sam may be right, may always have been right, and maybe he has brought out something that will be used. Still, I think he'll find, if he hasn't learned long ago, that it's nice to be right but it doesn't count unless you're right on time.

—ALGIS BUDRYS

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THE GREAT STUPIDS

by MIRIAM ALLEN deFORD

They were extremely nice kids.
Too bad they were all so dumb!

The year 2116: that was when suddenly every human being in the world under 50 years of age became completely unable to reason. And only Daniel Vollard knew why.

Novels on which enormous advance royalties had been paid could not be delivered because their authors had forgotten how to write. Urgent scientific projects were abandoned when the staffs found themselves unable to figure out the next step. Political campaigns ended abruptly when the candidates on both sides could no longer argue and their speechwriters could not produce anything but gibberish. Babies died by the dozens because neither mothers, doctors, nor nurses could understand how to feed and care for them.

The appalling situation extended to the most trivial details. "I want some kind of meat," the housewife would tell the butcher. And the butcher would stare back at her and say vaguely, "Meat? Yes, I guess I have some. How do you tell which is which?"

"I don't know how to do it," the beauty operator would confess to the customer whose gray hair she had been tinting for years. And the customer had to explain from memory what to use and how to use it.

For the minds of those over 50 were not in the least impaired.

Of course, for centuries now it had been popularly understood

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that all *real* thought, all originality, all ability and keenness and understanding, were within the grasp only of the young. To be sure, there were a few minor fields in which the superfluous old might still carry on their previous preoccupations — philosophy, say, or theology, or even law, in which it was necessary only to follow precedent and consult the authorities of the past. (Even so, there would be no more lawyers now, because law students could no longer tell the difference between a tort and an affidavit.) But in all the things that mattered, life ended at 40, when compulsory retirement began and one entered the limbo of Senior Citizenship, the Golden Years in which one had nothing to do but wait for boredom to bring physical existence to its predestined close.

Oh, the old, it was conceded, were quite capable of made-work and pretended industry. They could amuse themselves by learning ceramics or carpentry, or forcing their muddled brains to enough study of a foreign language to read the headlines of a newstape, or they could volunteer for social aid that required only the weakest strain on the intellect, or engage in toil whose demands were merely physical and not too strenuous for flabby muscles and arthritic joints. But everything that really counted belonged to the young.

And then all at once — in October 2116, to be precise — the Great Stupidity descended without warning on all the young generals and prime ministers and astronomers and teachers and engineers and poets and labor organizers and penologists and spies. Successful burglars ceased to burgle, which was a good thing because successful detectives could no longer have recognized their M.O. Hitherto brilliant students failed their examinations ignominiously. International conferences broke up because diplomats had grown utterly confused about the subjects under discussion. A holiday-cruise spaceship en route to the Moon had crashed with a loss of all its passengers and crew because the pilot had forgotten what all the little lights and switches on his control board were supposed to mean.

And in Kankakee, Illinois, a small wiry man of 86 named Daniel Vollard rubbed his hands in glee and chuckled merrily.

It was his day of victory.

Things still worked mechanically, of course. His breakfast was delivered when he dialed for it, his video picked up the regular programs. His shower and air-conditioner and garbage disposal unit — he was a widower and

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lived alone — were all in order. It was the ten o'clock news broadcast that informed him his great scheme had triumphed.

Then he put in a long distance call to the Secretary General of the United Nations.

Soon the well-known slanting black eyes and graying red hair appeared on the screen. Ivan Ching was one of the very few exceptions to the Rule of Youth; his father's people had not been able to shed altogether their immemorial reverence for the wisdom of old age, and Ching was still in office at the advanced age of 63.

"Dr. Daniel Vollard here," said the 86-year-old scientist crisply. "Do you know who I am?"

"The biochemist?" Ching countered. "Yes, of course."

"And president and major stockholder of the Universal Food Corporation — remember that," said the man from Kankakee. "Well, let's not waste time in preliminaries. We both know what's happened. Do you want it stopped?"

"You mean — you have a cure for this incredible calamity?"

"Yes," said Dr. Vollard quietly, "I can stop it. I started it."

He held his breath; this was the crucial moment. He could almost feel the Secretary General's mind darting rapidly over the problem.

"That would be a crime of unprecedented proportions," Ching said slowly.

"I realize that, Mr. Secretary. I have given many years of my life to search for some other solution. I could find none."

"Solution of what?"

"Of an injustice," replied Dr. Vollard, "also of unprecedented proportions."

"To whom?"

"To us. To our fellow-humans who are relegated to the dustheap as soon as we reach full maturity and kept there no matter how strongly our minds and abilities continue to function. You and I, Mr. Secretary, are among the rare exceptions — you for reasons we all know, I because as independent head of a giant corporation I am my own master. I am now in a powerful bargaining position. Will you bargain?"

There was a long silence. Then Ching spoke.

"I cannot leave here," he said, "because at present I am the only person in the entire Assembly who has any clear idea of facts or conditions or procedure. How soon can you come?"

The two men met in the Secretary General's suite in a hotel near the United Nations Building.

"Mr. Secretary," he began, "there is, I am sure, no need to

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remind you, of all people, of the overwhelming domination of the current cult of youth. From the time, some 200 years ago, when Western civilization first developed this curious predilection for immaturity, this thing has ballooned to its present monstrous state.

"Now, you and I both know that it is true that many people, after they pass middle age, do display a weakening of their mental as well as their physical ability. On the other hand, many do not; we don't need to go back to Sophocles and Michelangelo and Verdi, we have seen it closer to hand."

"Yourself, for instance," suggested Ivan Ching with a slight smile.

"Myself as one," replied Daniel Vollard stoutly. "But only as one of many. And there would be many more whose minds are unimpaired by age if the pushing, grabbing young had not intimidated the meek among us. Moreover, the very things they have done to us — compulsory retirement, the near-impossibility of securing a decent job after 35 or so, the craze for extreme youth among singers and actors and musicians, the encouragement of sexual precocity that leads to too early and fragile marriages and the consequent shortening of the normal time-sequence between generations — all these things and more have resulted in the actual deterioration of intellects that under happier circumstances would have remained in prime condition until their owners' death. The brain is a part of the body like any other, and it atrophies under disuse.

"And when any of us have protested, or tried to fight for our right to remain in the human race as full participants, we have been snubbed by children who tell us horror stories about fossilized judges and stick-in-the-mud commanders and hidebound reactionary parliamentarians, or reproach us for our greed. 'You kept us down when you had the power,' they say to us in effect, 'and now that we have it, we mean to have our revenge.' "

"You exaggerate a little, doctor," said Ching pleasantly. "Or perhaps I just think so because I am still young enough to have been your son, and because I have not myself been obliged to face the neglect and contempt of my younger fellow-beings. But on the whole of course your view is correct. What I want to know now is what you have done to us, and how we can recover from it. For the world as it is today is quite intolerable. It has become a vast institution for the feeble-minded."

"Yes," said Vollard bluntly, "that is true. If I could have

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managed it with less disorder I should have done so, but I am convinced that only a sharp lesson can bring society to its senses."

"In other words," the Secretary General commented drily, "you have us where you want us, and you can make your own terms for our surrender."

"On the contrary, *we* have *them* where we want them, and we can make our terms."

"So what did you do, and how can it be undone?"

"Not so fast. First I announce the terms."

"Which are?"

"I want it illegal, anywhere on earth, to oblige a worker to retire because he has reached any certain age, or for any reason but the inability to perform his duties as well as he has done before. I want scientific and artistic and scholarly funds and endowments and awards open without limitations as to age, and may the best applicant receive them. I want people elected to office because they are the best candidates for the post, not because they have vibrant voices and agile bodies on video. In other words, I want for the last minority — the minority of years — what, two or three centuries ago, people fought for in the fields of sex and race, and won."

"You can't change the emotional attitudes of people by law," said Ching reflectively.

"I know that; I don't expect any sudden reversal of feeling. It will take another generation of educational reform to accomplish that. But if we have the legal backing we can implement the change.

"And that, as things stand, is largely up to you. By now every single nation belongs to the UN and abides by its direction."

"As a matter of fact, Dr. Vollard," said the Secretary General slyly, "I strongly suspect that you know that I know how easily that could be done today — as it could not have been done, say, a month ago. As of today, we have distinguished delegates from over 200 nations in the Assembly, and — thanks to you, apparently — they are a bunch of confused halfwits who will agree without hesitation to anything I suggest."

"Thanks, you should say, to the idiocy which has made it impossible for even a delegate to the world's greatest governing body to be appointed if he is over 30 or so."

"Touche. Very well, Dr. Vollard, if you can explain to me what you did and convince me that you can undo it, I shall present your — excuse me, our — demands and guarantee their acceptance."

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"All right, I'll explain. My particular specialty, as you may know, has been the relation between food and the operation of the metabolism. That, of course, was how I first became connected with the commercial enterprise which has grown to be the largest food-producing company in the world.

"Some time ago, in the course of analysis of the effects of isolated food-elements, I discovered that certain ingredients of the common diet affected not only physical but mental stability. After prolonged experiments with animals, I conducted a series of experiments with human volunteers, giving food containing one certain chemical to half of them, eliminating it from the food of the control group. I proved beyond doubt that heavy ingestion of this chemical (present, I emphasize, in harmless quantities in certain of the commonest of foods) resulted, as long as they continued to ingest it heavily, in weakening and obfuscation of the most important function of the brain — its reasoning power."

"I'm beginning to get a glimmering," Ching murmured. "Perhaps the old folk beliefs were right — fish as a brain-food, that kind of thing."

"Or oysters as an aphrodisiac? No, their choices were nonsense, but they may have had an intuitive grasp of the concept. Well, you have probably guessed what I did. Universal Foods has a practical monopoly of foods and drinks for mass consumption. It occurred to me that if I introduced extremely heavy doses of this chemical into certain products, the effect would be — what we see around us today."

"But man!" The Secretary General looked almost as confused as all his juniors. "How in the world could you doctor these products so that only *young* people could be affected by them?"

Dr. Vollard laughed outright.

"Oh, come now, Mr. Ching," he retorted, "think what you lived on by preference when you were, say, 11 to 25, but wouldn't dream of eating after you became middle-aged.

"Tell me, Mr. Secretary, how many years has it been since your idea of a perfect meal consisted of a peanut butter and jelly sandwich, a hot dog and a bottle of soda pop?"

—Miriam Allen deFord

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CONCLUSION

TO OUTLIVE ETERNITY

by POUL ANDERSON

Illustrated by GAUGHAN

To find a habitable planet was hopeless — nor could they stay in the ship — but still there was one possible salvation!

In its Stockholm headquarters, the Control Authority decided that an expedition should be sent to Beta Virginis. This star was 32 light-years from Earth, but an unmanned probe had radioed the information that it had planets. A spaceship traveling near the speed of light could get there reasonably soon as far as the crew was concerned, because of relativistic time differential. To be sure, protection was required; striking interstellar gas at such velocity, the ship would release a lethal blast of hard radiation. But electromagnetic force-fields could prevent this, as well as keeping interior weight at a constant one gravity whatever the

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acceleration. Most important, those same force-fields scooped up the gas, burning some in a nuclear reaction to power the expulsion of the rest by a ramjet effect. Thus, while the speed of light was an absolute limit, there was no limit on how close such a vessel might approach that speed. Hence there was no limit on her tau factor — which, among other things, measured the difference between the time rates aboard ship and in the outside universe.

So Leonora Christine departed: Captain Lars Telander, First Mate Ingrid Lindgren, a total complement of 50. They were equally divided as to sex (and relationships between the sexes were purposely left free) but all were high caliber, technically trained people. They meant to spend several years at least in the Beta Virginis system, studying it. If the one planet which seemed Earthlike really was habitable, they would found a permanent colony.

But ten years out (approximately one year, ship's time), they met disaster. The ship ran into a small, dark cosmic cloud. Though she was not seriously damaged, the impact disabled her decelerator unit. It could be fixed, if a gang went outside. But first the force-screens comprising the accelerator must be turned off. And without this for a shield, everyone would instantly be killed. Thus Leonora Christine seemed doomed to run forever, unless her people chose suicide.

Charles Reymont — constable, which meant policeman and military chief, of the expedition — got an idea, which Navigator Boudreau agreed might work. If they could go where interstellar gas was so thin that its radiation posed no hazard, they could make the repair. It meant they must leave, not only the galaxy, but this entire galactic cluster. Though they would be crossing millions of light-years, taking an equal number of years to do so as measured in cosmic time, the crew would experience no more than a few years . . . if they raised the tau factor high enough. This they could do by partially circumnavigating the home galaxy, passing through its heart, and thence outward. Eventually, in another member of the next galactic cluster, they should be able to decelerate and look for a planet to settle on.

The expedition agreed to make the attempt. But during the months that followed, tension, discouragement and sensory deprivation wore people down. Reymont made enemies in his attemps to maintain discipline. Among them were Chief Engineer Fedoroff, scientists Williams and

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Emma Glassgold. He was estranged from Ingrid Lindgren, though they had once been lovers. Few except the girl Chi-yuen Ailing, and those men, like Johann Friewald, who were his deputies, liked him now.

And yet order and morale must be kept up, or they had no chance whatsoever of survival.

VIII

The speed of light can be approached, but no body possessing rest mass can quite attain it. Smaller and smaller grew the increments of velocity by which *Leonora Christine* neared that impossible ultimate. Thus it might have seemed that the universe which her crew observed could not be distorted further. Aberration could, at most, displace a star 45°; Doppler effect might infinitely redden the light from astern, but could only double the frequency of light ahead.

But there was no limit on tau, and that was the measure of change in perceived space and experienced time. Accordingly, there was no limit to the violet shift either; and the cosmos fore and aft could shrink toward a zero thickness wherein all the galaxies were crowded.

Thus, as she made her great swing partly around the Milky Way and turned for a plunge straight through its heart, *Leonora Christine*'s periscope revealed a weird demesne. The nearer stars streamed past, faster and faster, until at last the human eye could see them marching across the field of view; because by that time, many years passed outside while a minute or two ticked away inside the ship. That field was no longer black. It was a shimmering purple, which deepened and brightened as the months went by; because the interaction of forcefields and interstellar medium — eventually, interstellar magnetism — was releasing quanta. The farther stars were coalescing into two globes, fiery blue ahead, ember crimson aft. But gradually those globes shrank toward points, and dimmed; because well-nigh the whole of their radiation had been shifted out of the visible spectrum, toward gamma rays and long radio waves.

The viewscope had been repaired, but was increasingly less able to compensate, to show the sky as a stationary observer would have seen it. The circuits simply could not distinguish individual stars any longer, at more than a few parsecs' remove. The electronicians took the instrument apart and rebuilt it to step up lowered and step down heightened frequencies, lest men fly altogether sightless.

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That project, and certain other remodelings, provided a useful outlet for those able to help. Such people began to emerge from their shells. Nonetheless, Reymont found a need to hail the astronomer Elof Nilsson to the interview room.

Ingrid Lindgren sat behind her desk, once more uniformed. She had lost weight, and dark circles lay beneath her eyes. The cabin thrummed louder than normal, and occasionally a shiver went through ribs and deck. Here, in the immense clouds which surrounded the clear space at the galaxy's core, *Leonora Christine* moved according to an eerie sort of aerodynamics. Her tau was now so enormous that density did not trouble her, rather she swallowed matter still more greedily than before. But she flew as if through a wind blowing between the sun clusters.

"Do you accuse Dr. Nilsson of spreading disaffection, Constable?" Lindgren's tone was weary. "The articles provide for free speech."

"We are scientists," the astronomer said waspishly. "We have not only the right but the obligation to state what is true." He was a short, rather ugly man who had not gotten along ideally with his fellows even before the crisis came. Since then he had let a scraggly beard grow and seldom bathed. His clothes were begrimed.

Reymont shifted on the bench. Both men were seated at Lindgren's urging. "You don't have the right to spread horror stories," he said. "Didn't you notice what you were doing to Jane Sadler, for instance, when you talked the way you did at mess?"

"I merely brought out into the open what everybody has known from the start," Nilsson rasped. "They hadn't the courage to discuss it in detail. I do."

"They hadn't the meanness to discuss it," Reymont answered. "You do."

"No personalities," Lindgren said. "Tell me what the matter was." She had lately been taking her meals alone in the cabin she shared with the naturalist Olga Sobieski. In fact, she was not seen much off duty.

"You know," Nilsson said. "We've raised the subject before."

She couldn't quite suppress dislike in the look she gave him. "What subject? We've talked about many."

"Talked, yes, like reasonable people," Reymont said. "Not lectured a tableful of shipmates, most of them feeling low already."

"Please, Constable. Proceed, Dr. Nilsson."

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The astronomer puffed himself up. "An elementary thing," he said. "I cannot understand why the rest of you have been such idiots as not to give it serious consideration before. You blandly assume we will come to rest in some other galaxy and find a habitable planet. But will you tell me how? Think of the requirements. Mass, temperature, irradiation, atmosphere, hydrosphere, biosphere . . . the best estimate is that one per cent of the stars have planets which are any approximation to Earth."

"Oh," Lindgren said. "Yes, everybody knows — "

Nilsson was not to be deprived of his platform. Perhaps he didn't bother to hear her. He ticked points off on his fingers. "If one per cent of the stars are suitable, do you realize how many we will have to examine in order to have an even chance of finding what we need? It is conceivable that we will be lucky and come upon our New Earth at the very first star we try. But the odds against this are a hundred to one. Thus we will have to try many. Now the examination of each involves almost a year of deceleration. To depart from it and search elsewhere requires another year of acceleration. Those are years of ship's time, remember, because nearly the whole period is spent at velocities which are small compared to light's and which thus involve a negligible tau factor. Hence we must allow two of our years per star, as a minimum. The fifty-fifty chance of which I spoke — and mind you, that is only a fifty-fifty chance — the odds are as good that we will not find New Earth in the first seventy-five stars as they are that we will — this chance requires a hundred or a hundred and fifty years of search. We will not live so long.Therefore our whole endeavor, the risks we take in this fantastic dive straight through the galaxy and out into intergalactic space, it is all futile. *Quod erat demonstrandum.*"

"Among your many detestable characteristics, Nilsson," Reymont drawled, "is your habit of droning the obvious through your nose."

"Madam!" the astronomer gasped. "I protest! I shall file charges of personal abuse!"

"Cut back," Lindgren said. "Both of you. I must admit your conduct offers provocation, Dr. Nilsson. On the other hand, Constable, you should remember that Dr. Nilsson is one of the most distinguished men in his profession that Earth has . . . Earth had. He deserves respect."

"Not the way he behaves," Reymont said. "Or smells."

"Be polite, Constable, or I'll charge you myself," Lindgren

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said. She drew breath. "You don't seem to make allowance for humanness. We are adrift in space and time; the Earth we knew is a hundred thousand years in its grave; we are rushing nearly blind through a crowded part of space; we may at any minute strike something that will destroy us; at best, we must look forward to months, probably years in a cramped and barren environment. Don't you expect people to react to that?"

"Yes, madam, I do," Reymont said. "I don't, however, expect them to behave so as to make matters worse."

"There is some truth in that," Lindgren admitted.

Nilsson squirmed and looked sulky. "I was just trying to spare them disappointment at the end of this flight," he muttered.

"Are you quite certain you weren't indulging your ego—? Never mind. Your standpoint is legitimate." Lindgren sighed.

"No, it isn't," Reymont said. "He gets his one per cent by counting every star. Obviously we aren't going to bother with red dwarfs — the vast majority — or blue giants or anything outside a fairly narrow spectral range. Which reduces the field of search by a whopping factor."

"Make the factor ten," Nilsson said. "I don't really believe that, but let's grant we have a ten per cent probability of finding New Earth at any one of the Sol-type stars we try. That nevertheless requires us to hunt among five or more to get our even chance. A dozen years? The youngest among us will be past his youth. Some will be getting old. The loss of so many reproductive years means a corresponding loss of heredity; and our gene pool is small, indeed minimal, to start with. You must agree on the impossibility of having children while we are in space. If nothing else, we are too crowded. Yet if we wait one or two decades to start having them, we can't beget enough. Few will be grown to self-sufficiency by the time their parents start getting helpless with advancing years. And in any case, the human stock will certainly die out in a few generations. I know something about genetic drift, you see."

He looked smug. "I didn't wish to hurt your feelings," he said. "My desire was to be of service, by showing your concept of a bold pioneer community, planting humankind afresh in a new galaxy . . . showing that chatter for the romantic fantasy which it is."

"Have you an alternative?" Lindgren asked.

Nilsson's mouth twisted, an uncontrollable tic. "Nothing but realism," he said. "Acceptance of

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the fact that we will never leave this ship. Adjustment of our behavior to that fact."

"You understand, I suppose," Reymont said, "that for half the people aboard, the logical thing to do once they've decided you're right is to commit suicide."

"That may well be," Nilsson said.

"Do you hate life so much yourself?" Lindgren asked.

Nilsson jerked on the bench. He gobbled. Reymont made haste to say:

"I didn't haul you in here only to scold you. I want to know why you haven't any ideas for improving our chances."

"What ideas?"

"That's what I'm asking you. You're the observational astronomer. As I recall, you were in charge of programs back home which located something like fifty other planetary systems. You actually identified individual planets across all those light-years. Why can't you do the same for this ship?"

"Ridiculous!" Nilsson pounced. "I see that I must explain the matter in kindergarten terms. Will you bear with me, Mate Lindgren? Listen carefully, Constable. True, a very large space-borne instrument can pick out an object the size of Jupiter at a distance of several parsecs. This is provided the object gets sufficient illumination, but not so much that it is lost in the glare of its sun. Also true, by mathematical analysis of perturbation data gathered over a period of years, some idea can be obtained about companion planets which are too small to photograph directly. Ambiguities in the equations can, to a degree, be resolved by close interferometric study of flare-type phenomena on the star; planets do exercise a certain small influence upon such cycles.

"But." His finger prodded Reymont's chest. "But you do not realize how uncertain those results are. Journalists were fond of trumpeting that yet another Earthlike world had been discovered. The fact always was, however, that this was one possible interpretation of our data. Only one among several possible size and orbit distributions. And subject to a gross probable error. All this, mind you, with the largest, finest instruments which could be orbited. Instruments such as we certainly do not have with us here.

"No, even at home, the sole way to get detailed information about extrasolar planets was to send a probe or a manned expedition there. In our case, the sole way is to decelerate for a close look. And thereafter, I am certain, to go on. Because you must

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be aware that a planet which otherwise seems ideal could be lifeless, or could have a native biochemistry useless or deadly to us.

"I implore you, Constable, to learn a little science, a little logic, perhaps just a touch of realism. Eh?" Nilsson ended with a crow of triumph.

"Doctor —" Lindgren began.

Reymont smiled crookedly. "Don't worry, madam," he said. "No fight will start. His words don't diminish *me*." He regarded the other man with care. "Believe it or not, I knew very well what you've told us. I also know you are, or were, an able fellow. That you made some innovations, some new gadgets and systems of your own, which were responsible for a lot of discoveries. Well, why not put your brain to work on the problem we have here?"

"Will you be so good as to condescend to suggest a procedure?" Nilsson fleered.

"I'm no scientist, nor much of a technician," Reymont said. "But a few things look obvious to me. Let's suppose we have entered our target galaxy. We've shed the ultra-high tau we needed to get there, but we still have one of . . . oh, whatever is convenient. A thousand, perhaps? Well, that gives you a mighty long baseline and cosmic-time period to make your observations. In the course of some weeks or months, ship's time, you can collect more data on a given star than you had on any of Sol's neighbors. I should think you could find ways to use relativity effects to give you information that wasn't available at home. And, naturally, you'll be observing a large number of Sol-type stars simultaneously. So you're bound to find some which you can prove — prove with such exact figures that there's no reasonable doubt — have planets with masses and orbits about like Earth's"

"But even then," Lindgren said hesitantly, "the question of atmosphere, biosphere, that remains. We still need to take a close-range look."

"Yes, yes," Reymont agreed. "But must we stop to take it? Suppose, instead, we lay out a course which brings us hard by the most promising suns, one after the next — while we continue to travel near light-speed. In cosmic time, we'll have hours or days to make studies of any planet that interests us. Spectroscopic, thermoscopic, photographic, magnetic, write your own list of clues. We can get a good idea of conditions on the surface. Biological conditions, too. We could look for things like thermody-

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namic disequilibrium, chlorophyl reflection spectra, polarization by microbe populations based on l-amino acids . . . yes, I think we can get an excellent idea of whether that planet is suitable. At high tau, we can examine any number in a short stretch of our own time. Our instruments will have to be automated, in fact; we ourselves couldn't work fast enough. Then, when we do find the right world, we can brake, make turnaround and come back. That will take a couple of years, I admit. But they'll be endurable years. Because we'll know, with very high certainty, that we have a home waiting for us!"

Color mounted in Lindgren's cheeks. Her eyes looked less dull. He had not seen so much life in her for months. "By God," she breathed, "why didn't you speak of this before?"

"I was too busy to think beyond the next day," Reymont said. "Why didn't you, though, Dr. Nilsson?"

"Because the whole thing is absurd," the astronomer said. "You presuppose instrumentation we do not have."

"Well, can't we build it? We do have tools, precision equipment, construction supplies. Maybe we can't put together an enormous telescope, a mirror a few molecules thick, around the hull, once we're safe in intergalactic space. I'm not sure we can't, but let's assume so. Is that the only way? How about electronic amplification, for instance?"

"You talk of instruments which don't exist. Especially those with which you want to analyze a planet's biochemistry as you zip past at light speed. No such thing — such sensitivity and range — no such thing has ever been constructed."

"Well?" Reymont said.

Nilsson and Lindgren stared at him. Silence thrummed.

"Well, why can't we develop what we need?" Reymont asked in a puzzled voice. "Here's a whole shipful of some of the most talented, highly trained, imaginative people our civilization produced. They include almost any scientific specialty you care to name; but they're used to interdisciplinary work as well. Suppose, for instance, Emma Glassgold and Norbert Williams got together to work out the specifications for a life-analyzing instrument. They'd consult others as needed. Eventually they'd employ physicists, electronicians and such for the actual building and debugging. Meanwhile, you, Dr. Nilsson, have been in charge of a team making gadgets for long-range planetography. In fact, you're the logical man to head up the instrumentation program."

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His enthusiasm waxed. The hardness fell from him. He said, eager as a boy: "Why, this is precisely what we've needed! A fascinating, vital sort of job that demands everything everybody can give. And those whose specialties aren't called for, they'll be necessary too. They'll be assistants, manual workers—I suppose we'll have to remodel a lot of the ship's interior to accommodate the bigger instruments — Ingrid, it's a way not just to save our lives but our minds! Our souls!"

He sprang to his feet. She did too. Their hands reached out and clasped.

Suddenly they grew aware of Nilsson.

He sat less than dwarfish, hunched, shivering, altogether collapsed.

Lindgren went to him in alarm. "What's the matter?" she exclaimed.

He stared at the deck. "Impossible," he mumbled. "Impossible."

"No. Surely not," she said urgently. "I mean, you wouldn't have to discover any new laws of nature or anything like that, would you? It seems to be only a question of applying known principles."

"In unheard-of ways." Nilsson hid his face. "God better me, I haven't the brains any more."

Lindgren and Reymont exchanged a look above his bent back. She shaped words, unspoken. Once he had taught her the Rescue Corps emergency trick of lip-reading, and they had practiced it as a game they shared, a thing that made them more private and more one. *Can we succeed without him?*

I doubt it. He is in fact the best man to organize that kind of project. At least, lacking him, we have a much poorer chance.

Lindgren sat down beside Nilsson. She laid an arm across his shoulders. "What's the matter?" she asked most softly.

"I have no hope," he snuffled. "Nothing to live for."

"Oh, but you do."

"What? You know Rosana . . . deserted me . . . months ago. No other woman — Why should I care? What's left for me?"

Reymont's lips formed, *Now he's begun pitying himself.* Lindgren frowned and shook her head.

"No, you're wrong, Elof," she murmured. "We do care for you. Would we ask for your help now if we didn't honor you?"

"My mind." He sat straight and glared at her out of swimming eyes. "You want my mind, yes. My advice. My knowledge and skill. To save yourselves. But do you want me? Do you think of me as, as, as a human being? No! Dirty old Nilsson. One is

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barely polite to him. But when he starts to talk, one finds the earliest possible excuse to leave. One does not invite him to one's parties. Most certainly never to one's cabin. At most, if desperate, one asks him to be a fourth for bridge or to lead an instrument development effort. Well, what do you expect him to do? Thank you?"

"But that isn't true!"

"Oh, I'm not as childish as some," he said. "I'd help you if I could. But my mind is blank, I tell you. I haven't had an original thought since the disaster. Call it fear of death paralyzing me. Call it a sort of impotence. I don't care what you call it. Because you don't care either. No one has offered me friendship, comfort, anything. I have been left alone in the dark and the cold. Do you wonder that my mind has frozen?"

Lindgren looked away, so that none but Reymont could see what expressions chased across her features. When she faced Nilsson again, she was calm.

"I can't say how sorry I am," she told him. "You are a little to blame yourself, Elof. You acted so . . . so self-sufficient . . . we assumed you didn't want to be bothered. The way Olga Sobieski, for instance, doesn't want to. That's why she moved in with me. When you moved in with Hussein Sadek—"

"He keeps the panel closed between our halves," Nilsson shrilled. "He never opens it. But I often hear, off-watch, first one girl in there, then another."

"Well, but now we understand," Lindgren said. She smiled. "And to be quite honest, Elof, I've grown a little tired of my own current existence."

Nilsson made a strangled noise.

"I believe we have some personal business to discuss," Lindgren said. She was pale again, but continued to smile. "Do you mind, Constable?"

"No," said Reymont. "Of course not." He left the cabin.

IX

Leonora Christine stormed through the galactic nucleus in 20,000 years. To those aboard, the time was measured in hours. They were hours of tension, while the hull shook and groaned from stress, and the outside view was of little more than a blinding blazing fog: because here the concentration of interstellar matter was great indeed. The chance of striking a sun was not negligible; lurking in a dust cloud, it could be upon the ship before any course alteration was possible. (No one knew what would happen to the star. It might go nova. But certainly the vessel herself would be destroyed, too swiftly

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for her crew to realize they were dead.) On the other hand, this was the region where tau mounted to values that could merely be estimated, not measured with precision, most surely not comprehended.

There was a respite while she crossed the region of clear space at the very center, like passing through the eye of a hurricane. Foxe-Jameson, the astrophysicist, came near weeping. "Too bloody awful! The answers to a million questions, right here, and I've not a single instrument adapted for the conditions!"

His shipmates grinned. "And where would you publish?" someone asked. Renascent hope was often expressing itself in a kind of gallows humor.

But there was no joking when Boudreau called a conference with Telander and Reymont. That was soon after the ship had emerged from the dust clouds on the far side of the nucleus — by then, her jets used dust as readily as gas — and headed out through a spiral arm. The viewscope showed a red fireball dwindling behind, a gathering darkness ahead. People off duty celebrated in commons with music, dance, a liquor ration. They had run the cosmic shoals and not been wrecked. Laughter, stamping, lilt of an accordion drifted faintly to the bridge.

"It's like this," the navigator said. "Nilsson's project is showing results already, you know; and we also have my standard observational gear, together with some stuff intended for research from a Beta Virginis base. I prepared to take my readings before we entered the galactic core. Now that we're out, I have taken them."

Captain Telander's gaunted visage grew tight, as if readying for a new blow. "What result?" he asked.

"What readings?" Reymont added. "I mean, what specifically were you studying?"

"Matter density in space ahead of us," Boudreau said. "Within this galaxy, between galaxies, between galactic clusters. Given our present tau, the frequency shift of the neutral-hydrogen radio spectrum, I can get results of unprecedented accuracy."

"Oh, yes. That. What have you found out?"

Boudreau braced himself. "The gas concentration drops off more slowly than we thought," he said. "With the tau we will probably have by the time we leave this galaxy . . . thirty million light-years out, as nearly as I can determine, we still will not dare turn off the forcefields."

Telander closed his eyes. Reymont nodded, jerkily. "We've

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discussed the possibility of that being the case," he said, word by word. The scar stood livid on his brow. "That even halfway between two clusters, we won't be able to make our repair. But you act as if you had some proposal."

"The one we talked about, you and I," Boudreau said to the captain.

Reymont waited.

Boudreau told him in a dispassionate voice: "The astronomers had learned before we left home, a cluster or family of galaxies like our local group is not the highest form in which matter is organized. Such groups of one or two dozen galaxies do, in turn, tend to occur in larger associations. Superfamilies, so to speak —"

Reymont made a rusty chuckle. "Call them clans," he suggested.

"Eh? Why . . . well. All right. A clan is composed of several families. Now the average distance between members of a family is, oh, perhaps a million light-years. The average distance between one family and the next is greater, as one would expect: on the order of fifty million light-years. Our plan was to leave this family and go to the nearest attainable one beyond. Both would have belonged to the same clan."

"Instead, we'll have to leave the entire clan," Reymont said.

"Yes, I am afraid so."

"How far is it to the next one?"

"I don't know. I didn't take journals along. They would be a little obsolete by now, eh?"

"Be careful," Telander warned.

Boudreau gulped. "I beg the captain's pardon. That was a rather dangerous joke." He went back to lecturing tone: "I don't believe anyone was sure. Probably less than five hundred million light-years, though. Otherwise the hierarchical structure of the galaxies would have been easier for astronomers to identify than it was. Surely, between such clans, space is so close to an absolute vacuum that we won't need protection."

"Can we navigate there?" Reymont demanded.

Sweat glistened on Boudreau's cheeks. "You see the risk," he said. "We will be bound into the totally unknown. Accurate sightings and placements will be unobtainable. We shall need such a tau —"

"A minute," Reymont said. "Let me outline the situation in my layman's language, to make sure I understand you." He paused, rubbing his chin with a sandpapery sound (under the distant music), frowning, until his thoughts were collected.

"We must get — not only into interfamily but interclan space," he said. "We must

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do this in a reasonable shipboard time. Therefore we must run tau up to a value of a billion or more. Can we do this at all? Evidently so, or you wouldn't talk as you've done. I imagine the method is to set ourselves a course within this family such that we will pass through the nuclei of at least one other galaxy. And then go likewise through the next family—through as many individual galaxies as possible, always accelerating.

"Once the entire clan is behind us, we should be able to make our repair. But then we'll need a similar period of deceleration. And because our tau will be so great and space so utterly empty, we'll be unable to steer. Not enough material will be there for the jets to work on, nor enough navigational data to guide us. We'll just have to hope that we'll pass through another clan.

"We should do that. Eventually. By sheer statistics. But we may go so far first that the expansion of the universe will be working against us. We may be out yonder a long while indeed."

"Correct," Telander said. "You do understand."

"*— But me and my true love will never meet again,*

On the bonnie, bonnie banks of Loch Lomond."

"Well," Reymont said, "there doesn't appear to be any virtue in caution. In fact, for us it's become a vice."

"What do you mean?" Boudreau asked.

Reymont shrugged. "We need more than the tau for crossing space to the next clan. We need the tau for a hunt which may take us past any number of clans, through billions of light-years, until we find one we can enter. I trust you can plot us a course within this first clan that will give us that kind of tau. Don't worry about collisions with anything. We can't afford such worries. Just steer us through the densest dust and gas you can find."

"You . . . are taking this . . . rather coolly," Telander said.

"What am I supposed to do? Burst into tears?"

"That's why I thought you should also hear the news first," Boudreau said. "You may know how to break it to the others."

Reymont considered both men for a moment that stretched. "I'm not the captain, you know," he said softly.

Telander's smile was a spasm. "In certain respects, Constable, you are."

Reymont turned, went to the instrument console, stood before those goblin eyes with head bent and thumbs hooked in belt. "Well," he said. "If you really want me to take charge."

"I think you had better."

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"Well, in that case. They're good people. Morale is bound upward again, now that they see some genuine accomplishment of their own. I think they'll be able to realize, not just intellectually but emotionally, that there is no human difference between a million and a billion, or ten billion, light-years. The exile is still the same."

"But the time involved — " Telander said.

"Yes. That." Reymont looked at them again. "I don't know how much more of our own lifespans we can devote to this voyage. Not very much. The conditions are too unnatural. So we absolutely have to raise tau as high as may be, no matter what the hazard. Not simply to make the trip itself short enough for us to endure. But for the psychological need to do our utmost, at all times."

"How is that?"

"Don't you see? It's our way of fighting back at the universe. *Vogue la galere.* Go for broke. Full steam ahead and damn the torpedoes. I think, if I can put the matter to our people in such terms, they'll rally. For a while, anyhow."

"The wee birdies sing and the flowers of spring,
And in sunshine the waters are sleeping — "

X

Dark.

The absolute night.

Instruments, straining magnification, reconverting wavelengths, identified some glimmer in that pit. Human senses found nothing, nothing.

"We're dead." Fedoroff's voice echoed in helmets and earplugs.

"I feel alive," Reymont said.

"What else is death but the final cutting off? No sun, no stars, no sound, no weight, no shadow — " Fedoroff's breath was ragged, to clear over a radio which no longer carried the surf noise of cosmic interference. His head was invisible against empty space. The lamp at his waist threw a dull puddle of light onto the hull, that was reflected and lost in horrible distances.

"Keep moving," Reymont ordered.

"Why are you out with this work party, Constable?" said another man's voice. "What do you know about it?"

"I know we'd better get the job done. Which seems to be more than you knotheads do."

"What's the hurry?" Fedoroff gibed. "We have eternity. We're dead, remember."

"We will indeed be dead if we're caught, force-shields down, in anything like a real concentration of matter," Reymont

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answered. "One atom per cubic meter — or less — could kill us. And with our tau, the nearest galactic clan is only days away."

"So?"

"So are you absolutely certain, Engineer Fedoroff, that we won't strike an embryo galaxy, family, clan . . . some enormous hydrogen cloud, still dark, still falling in on itself . . . at any instant?"

"At any megayear, you mean," Fedoroff said. But he started aft from the main personnel lock. His gang followed.

It was, in truth, a flitting of ghosts. One had thought of space as black. But now one remembered that it had been full of stars. Any shape was silhouetted against suns, clusters, constellations, nebulae, sister galaxies; oh, the universe was pervaded with light! The *inner* universe. Here was worse than a dark background. Here was no background. None whatsoever. The squat, unhuman forms of men in space armor, the long curve of the hull, were seen as gleams, disconnected and fugitive, With acceleration ended, weight was ended also. Not even the slight differential-gravity of being in orbit existed. A man moved as if in an infinite dream of swimming, flying, falling. And yet . . . he remembered that this weightless body of his bore the mass of a mountain. Was there a real heaviness in his floating; or had the constants of inertia subtly changed, out here where the metric of space-time was flattened to nearly a straight line; or was it an illusion, spawned in the tomb of stillness which engulfed him? What was illusion? What was reality? *Was* reality?

Roped together, clinging with frantic magnetism to the ship's iron (curious, the horror one felt of getting somehow pitched loose — extinction would be the same as if that had happened in the lost little spaceways of the Solar System — but the thought of blazing across megayears as a stellar-scale meteorite was peculiarly lonely), the engineer detail made their way along the hull and the spidery framework which trailed it. Now that the accelerator system had been shut down, those ribs were all which held the generators together. They seemed terribly frail.

"Suppose we can't fix the decelerators," came a voice. "Do we go on? What happens to us? I mean, won't the laws be different, out on the edge of the universe? Won't we turn into something not human?"

"Space is finite," Reymont barked into the blackness. " 'The

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edge of the universe' is a meaningless noise. And let's start by supposing that we can fix this stupid machine."

He heard a few oaths and grinned the faintest bit. When they halted and began to secure themselves individually to the framework that surrounded their task site, Fedoroff took the chance to lay his helmet against Reymont's and talk in private by conduction.

"Thanks, Constable," he said.

"What for?"

"Being such a prosaic bastard."

"Well, we have a prosaic job of repair to do. We may have come a long way, we may by now have outlived the race that produced us, but we haven't changed from being a variety of proboscis monkey. Why take ourselves so mucking seriously?"

"Hm. I see why the Old Man said you should come along. All right, let's have a look at the problem here."

XI

Reymont opened the door to his cabin. Weariness made him careless. Bracing himself a trifle too hard against the bulkhead, he let go the handle and drifted free.

For a moment he cartwheeled in midair. Then he bumped into the opposite side of the corridor, pushed and darted back across. Once inside the cabin, he grasped a stanchion before shutting the door behind him.

At this hour, he had expected Chi-yuen to be asleep. But she floated a few centimeters off her bunk, a single line anchoring her amidst currents. As he entered, she returned her book to a drawer with a quickness that showed she hadn't really been paying attention to it.

"Not you, too?" Reymont asked. His question seemed loud. They had been so long accustomed to the engine pulse as well as the gravity of acceleration that free fall brimmed the ship with silence.

"What?" Her smile was tentative and troubled. She had had scant contact with him lately. There was too much for him to do under these changed conditions, organizing, ordering, cajoling, arranging, planning. He would come here to snatch what sleep he might.

"Have you also become unable to rest in zero gee?" he said.

"No. That is, I can. A strange, light sort of sleep, filled with dreams, but I seem fairly refreshed afterward."

"Good," he sighed. "Two more cases have developed."

"Insomniac, do you mean?"

"Yes. Verging on nervous collapse. Every time they do drift

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off, you know, they wake again screaming. Nightmares. I'm not sure whether weightlessness alone does it to them, or if that's only the last bit of breaking stress. Neither is Dr. Winblad. I was just conferring with him. He wanted my opinion on what to do, now that he's running short of psychodrugs."

"What did you suggest?"

Reymont grimaced. "I told him who I thought unconditionally had to have them, and who might survive a while without."

"The trouble isn't simply the psychological effect, you realize," Chi-yuen said. "It is the exhaustion. Pure physical exhaustion, from trying to do things in a gravityless environment."

"Of course." Reymont began unfastening his coverall, one leg hooked around a stanchion to hold him in place. "Quite unnecessary. The regular spacemen know how to handle themselves. I do. A few others. We don't get worn out, trying to coordinate our muscles. It's those groundlubber scientists who do."

"How much longer, Charles?"

"In free fall? I don't know. We appear to be bearing down on a galactic clan. Our forcefields have already been reactivated, as a precaution. Because we *might* enter a sufficient gas density at any moment for the jets to work. But we can't be sure. Detailed observation is plain impossible, with the tau we now have."

"But what is the maximum time before we enter that clan and start to have weight again?"

"Less than a week, ship's clocks. Can't estimate closer."

She sighed relief. "We can stand that. And then... then we will be making for our new home."

"Hope so," Reymont grunted. He stored his clothes, shivered a little and took out a pair of pajamas.

Chi-yuen started. "What do you mean by that? Don't you know?"

"Look, Ai-ling," he said in an exhausted tone, "we've come two or three billion light-years from Earth. As far in time. We have no charts. No standard of measurement. Our tau is a number to guess at. We take spectrograms of entire galactic families, and assuming they are 'normal' — whatever that is! — we calculate tau from the frequency shift. But the probable error is huge. There are factors like absorption which simply aren't in our handbooks. Quite possibly some of the constants of physics are different enough out here to affect our results. How in hell's flaming name do you expect anyone to bring in an exact answer?"

"I'm sorry —"

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"This has been explained to everyone," Reymont said. "Repeatedly. Are the officers to blame if passengers won't listen to their reports? Some of you are going to pieces. Some of you have barricaded yourselves with apathy, or religion, or sex, or whatever comes to hand, till nothing registers on your memories. Most of you — well, it *was* healthy to work on Nilsson's R & D, but that's become a defense reaction in its own right. Another way of focusing your attention so as to exclude the big bad universe. And now, when free fall prevents you carrying on, you too crawl into your nice hidey-holes." His voice lifted in anger. "Go ahead. Do what you want. The whole wretched lot of you. Only don't come and peck at me any longer. D' you hear?"

He yanked on the pajamas and started to climb into his bunk. Chi-yuen unbuckled her lifeline, pushed across to him, embraced him.

"Oh, darling," she whispered. "I'm sorry. You are so tired, are you not?"

"Been hard on us all," he said lethargically.

"Most on you." Her fingers traced the cheekbones standing out under taut skin, the deep lines, the sunken and bloodshot eyes. "Why don't you rest?"

"I'd like to."

She maneuvered his mass into a stretched-out position, clipped on his leash, and drew herself close. Her hair floated across his face, smelling of summers on Earth. "Do," she said. "You can." For you, isn't it good not to have weight?"

"M-m-m, yes. Ai-ling, you know Tetsuo Iwasaki pretty well. Do you think he can manage without tranquilizers? Sven Winblad and I weren't sure —"

"Hush." Her palm covered his mouth. "None of that."

"But —"

"No. I won't have it. The ship isn't going to fall apart if you get one decent night's sleep."

"Well . . . well . . . maybe not."

"Close your eyes. Let me stroke your face — so. Isn't that better already? Now think of nice things."

"Like what?"

"Have you forgotten? Think of home. No. Best not that, I suppose. Think of the home we are going to find. Blue sky. Warm bright sun, light falling through leaves, dappling the shade, blinking on a river; and the river flows, flows, flows, singing you to sleep —"

"Um-m-m."

She kissed him very lightly. "Our own house. A garden. Strange colorful flowers. Oh, but we will plant seeds from Earth too, roses, honeysuckle, rosemary

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for remembrance. Our children."

He stirred. The fret returned to him. "Wait a minute, we can't make personal commitments. Not yet. You might not want, uh, any given man. I'm fond of you, of course, but —"

She brushed his eyes shut again before he saw the pain on her. "We are daydreaming, Charles," she laughed low. "Do stop being so solemn and literal-minded. Just think about children, everyone's children, playing in a garden. Think about the river. Forests. Mountains. Birdsong. Peace."

He tightened an arm around her waist. "You're a good person," he murmured.

"So are you. A good person who needs to be cuddled. Would you like me to sing you to sleep?"

"Yes." His words were already becoming indistinct. "Please. I like Chinese cradle songs."

She continued smoothing his forehead while she drew breath.

The intercom circuit clicked shut. "Constable," said Telander's voice, "are you there?"

Reymont jerked awake. "Don't," Chi-yuen begged. "Yes," Reymont said, "here I am."

"Would you come to the bridge? And don't alert anyone."

"Aye, aye. Right away." Reymont unbuckled his lifeline and pulled the pajama top over his head.

"They could not give you five minutes, could they?" she said bitterly.

"Must be serious," he rapped. "You'll keep this confidential till you hear from me." In a few motions he had donned coverall and shoes again and was on his way.

Telander and, surprisingly, Nilsson awaited him. The captain looked as if he had been struck in the belly. The astronomer was excited but had not lost his recent air of confidence and self-control He clutched a bescribbled sheet of paper. "Navigation difficulty, eh?" Reymont deduced. "Where's Boudreau?"

"This doesn't concern him immediately," Nilsson said. "I have been making my own observations with some of the new instruments. I have reached a, ah, disappointing conclusion."

Reymont wrapped fingers around a grip and hung in the stillness, regarding them. The fluorolight cast the hollows of his face into shadow. The gray streaks which had lately appeared in his hair seemed vivid by contrast. "We can't make that galactic clan ahead of us after all," he said.

"That's right." Telander drooped.

"No, not strictly right," Nilsson declared fussily. "We will pass through. In fact, we will pass

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through not just the general region, but a fair number of galaxies within the families that comprise the clan."

"You can distinguish so much detail already?" Reymont wondered. "Boudreau can't."

"I told you I have some of the equipment working," Nilsson said. "The precision seems even greater than hoped for when, ah, we instigated the project. Yes, I have a reasonably good map of the part of the clan which we might traverse. I have now finished making certain computations on that basis."

"Go on," Reymont said. "Once we get in where the jets have some matter to work on, why can't we brake?"

"We can. Of course we can. But our tau is too enormous. Remember, we acquired it by passing through the densest attainable portions of several galaxies, en route to interclan space. It was necessary. I do not dispute the wisdom of the decision. But the result is that this particular clan, at least, does not have enough material in it — not enough, I mean, within that conoidal volume which includes all our possible paths intersecting that clan, from this point we are now at — not enough for us to lose our entire velocity. We will emerge on the other side of the clan — after an estimated six months of ship's time under deceleration, mind you — with a tau that is still on the order of several thousand. This, you can see, will make it quite impossible to reach another clan before we die of old age. Especially in view of the fact which we are currently experiencing, that no significant acceleration is possible between clans."

The pompous voice cut off, the beady eyes looked expectant. Reymont met that gaze rather than Telander's sick, gutted stare. "Why am I being told this, and not Lindgren?" he asked.

A tenderness made Nilsson, briefly, another man. "She works so very hard. What can she do here? I thought I had best let her sleep."

"Well, what can *I* do?"

"Give me . . . us . . . your advice," Telander said.

"But sir, you're the captain!"

"We've been over this ground before, Carl. I can, well, yes, I suppose I can make the decisions, issue the commands, order the routines, which will take us crashing on through space, more or less safely." Telander extended his hands. They trembled like autumn leaves. "More than that I can no longer do, Carl. I have not the strength left. You must tell our shipmates."

"Tell them we've failed?" Reymont grated. "Tell them, in spite

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of everything, we're damned to fly on till we go crazy and die? You don't want much of me, do you, Captain?"

"The news may not be that bad," Nilsson said.

Reymont snatched at him, missed and hung with the breath raw in his throat. "We have some hope?"

The little man spoke with a briskness that turned his pedantry into a sort of bugle call:

"Perhaps. I have no data yet. The distances are too vast. We cannot choose another galactic clan as being accessible to us, and aim for it. We would see it with too great an inaccuracy, and across too many millions of years of time. But I do believe we can base a hope on sheer statistics. Someplace, eventually, we could meet the right configuration. Either a large clan through whose galaxy-densest portions we can lay a course; or else two or three clans, rather close to each other, more or less in a straight line, so that we can pass through them in succession. Do you see? If we could come upon something like that, we would be in good shap. We would be able to brake ourselves in a mere few years of ship's time."

"What are the odds?" Reymont's words rattled.

Nilsson shook his head. "I cannot say. But perhaps not too bad. This is a big and varied cosmos. If we continue sufficiently long, I should imagine we have a fair probability of encountering what we need."

"How long is sufficiently long?" Reymont lifted a hand. "Stop. Don't bother answering. It's on the order of billions of years. Tens of billions, maybe. That means we need a higher tau yet. A tau so high that we can actually circumnavigate the universe . . . in months, maybe in weeks. And that, in turn, means we can't start braking as we enter this clan up ahead. No. We accelerate again. After we've passed through — well, no doubt we'll have a shorter period of ship's time in free fall than this one was, until we strike another clan. Probably there, too, we'll find it advisable to accelerate, running tau still higher. We'll do so at every chance we get, from now till we see a journey's end we can make use of. Right?"

Telander shuddered. "Right," he said. "Can any of us endure it?"

"We'll have to," Reymont said. Now, once more, he spoke in the voice of command. "I'll figure out a tactful way to announce your news. I'll have the few men I can trust ready . . . no, not for violence. Ready with leadership, steadiness, encouragement. And

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we'll embark on a training program for free fall. No reason why it has to cause this much trouble. We'll teach every one of those groundlubbers how to handle himself in zero gee. How to sleep. By God, how to hope!" He smote his palms together with a pistol noise.

"Don't forget, we can depend on some of the women too," Nilsson said.

"Yes. Of course. Like Ingrid Lindgren."

"Like her indeed," Nilsson said gravely. "You know what she has done for me."

"M-hm. She is quite a girl, isn't she? I'm afraid you will have to go rouse her, Elof. We've got to get our cadre together — the unbreakables; the people who understand people — we must plan this thing. Start suggesting some names."

XII

"Oh, please," Jane Sadler had begged. "Come help him."

"You can't?" Reymont asked.

She shook her head. "I've tried. But I think I make matters worse. In his present condition. I being a woman." She flushed. "Know what I mean?"

"Well, I'm no psychologist," Reymont said. "But I'll see what I can do."

He left the bower where she had caught him in a private moment. The dwarfed trees, tumbling vines, grass and flowers made a place of healing for him. But he had noticed that comparatively few others went into that room any longer. Did it remind them of too much?

A zero-gee handball game bounced from corner to corner of the gymnasium. They were spacemen who played, though, and grimly rather than gleefully. Most of the civilians came here for little except their compusory exercises and — in a sporadic, uninterested fashion — their meals. No one hailed Reymont as he went by.

Further down the main corridor, a door stood open on a workshop. A lathe hummed within, a cutting torch glowed blue, several men were gathered around a bench discussing something. That was good. The instrument project continued. But it did so terminally, as mere refinement. Most of the labor was finished; cargo had been shifted. Number Two hold converted to an observatory, its haywire tangle neatened. There wasn't any work left for the bulk of Nilsson's team. There wasn't anything left except to abide.

Abruptly the ship quivered.

Weight grabbed at Reymont. He barely avoided falling to the deck. A metal noise toned through the hull, like a basso pro-

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fundo gong. It was soon over. Free flight resumed. *Leonora Christine* had gone through another galaxy.

Such passages were becoming more frequent by the day. Would they never meet the right configuration to stop?

Well, of course you had to employ your force screens, either accelerating or decelerating. And you dared not decelerate till you were quite sure. But each spate of acceleration made the required conditions for coming to a halt that much more tight. So you went on. And tau grew.

Reymont knocked on the cabin door he wanted. Hearing no reply, he tried it. Locked. But Sadler's adjoining door wasn't. He entered her cabin half and slid back the panel.

Johann Freiwald floated against his bunk. The husky shape was curled into an imitation of a fetus. But the eyes held awareness.

Reymont grasped a stanchion, encountered that stare, and said noncommittally, "I wondered why you weren't around, Hansi. Now I hear you aren't feeling well. Anything I can do for you?"

Freiwald grunted.

"Well, you can do a lot for me," Reymont said. "I need you pretty badly. You're a deputy. One of the half dozen who's stood by me — policeman, counselor, work-party boss, idea man — through this whole thing. You can't be spared yet."

Freiwald spoke as if with difficulty. "I shall have to be spared."

"Why? What's the matter?"

"I can't go on any more. That's all. I can't."

"Why not?" Reymont asked. "What jobs we have left to do aren't hard, physically. Anyhow, you're tough. Weightlessness never bothered you. You're a trained engineer, a pragmatist, a cheerful earthy soul. Not one of those self-appointed delicates who have to be coddled because their tender souls can't bear a long voyage." He sneered. "Or are you one?"

Freiwald stirred. His cheeks reddened a little. "I am a man," he said. "Not a robot. Eventually I start thinking."

"My friend, do you imagine we would have survived this far if the officers, at least, did not spend every waking hour thinking?"

"I don't mean your damned measurements, computations, course adjustments, equipment modifications. That's nothing but the instinct to stay alive. A lobster trying to climb out of a kettle has as much dignity. I ask myself, though, why? What are we doing? What does it mean?"

"*Et tu, Brute,*" Reymont sighed.

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Freiwald twisted about so that his gaze was straight into the constable's. "Because you are so insensitive... Do you know what year this is?"

"No. Neither do you. We have no way of determining it. And if you wonder what the year is on Earth, that's meaningless. Under these conditions, we have no simultaneity with —"

"Be quiet! I know that whole quacking. We have come many billion light-years. We are rounding the curve of space. If we came back, this instant, to the Solar System, we would not find anything. The sun died long ago. It swelled and brightened till Earth was devoured; it became a variable, guttering like a candle in the wind; it sank away to a white dwarf, an ember, an ash. The human race is dead!"

"Not necessarily," Reymont said.

"Then it's become something we could not comprehend. We are ghosts." Freiwald's lips trembled. He bit them till blood ran. "We hunt on and on, senselessly, meaninglessly —" Again acceleration thundered through the ship. "There," he whispered. His eyes were wide, white-rimmed, as if with fear. "We passed through yet anothr galaxy. Another good part of a million years. To us, seconds."

"Oh, not quite that," Reymont said. "Our tau can't be that great. We probably quartered a spiral arm."

"Destroying how many worlds? Don't tell me. I know the figures. We are not as massive as a star. But our energy — I think we could pass through the very heart of a sun and not notice."

"Perhaps."

"That's part of our hell. That we've become a menace to — to —"

"Don't say it. Don't think it. Because it isn't true. We're interacting with dust and gas, nothing else. We do transit many galaxies, because galaxies lie comparatively close to each other in terms of their own size. Within a family, the members are about ten diameters apart, or even less. Individual stars within any single galaxy, though, that's another situation entirely. Their diameters are such tiny fractions of a light-year. In a nucleus, the most crowded part... well, the separation of two stars is still like the separation of two men, one at either end of a continent. A big continent. Asia, say."

Freiwald looked away. "There is no more Asia," he said. "No more anything."

"There's us," Reymont said. "We're alive, we're real, we have hope. What more do you want? Some grandiose philosophical sig-

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nificance? Forget it. That's a luxury. Our descendants will invent it, along with tedious epics about our heroism. We just have the sweat, tears, blood—" his grin flashed — "in short, the unglamorous bodily secretions. And what's so bad about that? Your trouble is, you think a combination of acrophobia, sensory deprivation and nervous strain is a metaphysical crisis. Myself, I don't look down on our lobster-like instinct to survive. I'm glad we have one."

Freiwald floated motionless.

Reymont clapped his shoulder. "I'm not belittling your difficulties," he said. "It *is* hard to keep going. Our worst enemy is despair; and it wrestles every one of us to the deck, every now and then."

"Not you," Freiwald said.

"Oh, yes," Reymont said. "Me too. I get my feet back, though. So will you."

"Well—" Freiwald scowled. "Maybe."

Reymont reached under his tunic and extracted a small flat flask. "Rank has its privileges," he smiled. "Here."

"What?"

"Scotch. The genuine article, not that witch's brew the Scandinavians think is an imitation. I prescribe a hearty dose for you, and for myself, as far as that goes. I'd enjoy a relaxed talk. Haven't had any such for longer than I can remember."

They had been at it for some while, and life was coming back in Freiwald's manner, when the intercom said with Ingrid Lindgren's voice: "Is Constable Reymont there?"

"Uh, yes," Freiwald said.

"Sadler told me so," the mate said. "Could you come to the bridge?"

"Urgent?" Reymont asked.

"Not really, I guess. The latest navigational sights seem to indicate a — a changing region of space. We may have to modify our cruising plan. I thought you might like to discuss it."

"All right," Reymont said.

"Me too," the other man said. He looked at the flask, shook his head sadly and offered it back.

"No, you may as well finish it, "Reymont said. "Not alone, however. That's bad, drinking alone. I'll tell Sadler."

"Well, now." Freiwald genuinely laughed. "That's kind of you."

Emerging, closing the door behind him, Reymont glanced up and down the corridor. No one else was in sight. Then he sagged, eyes covered, body shaking. After a minute he drew a breath and started for the bridge.

Norbert Williams happened to come the other way. "Hello," the chemist said.

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"You're looking cheerier than most," Reymont remarked.

"Well, yes, I guess I am. Emma and I, we got talking, and we may have hit on yet another way to tell at a distance whether a planet has our type of life. A plankton-type population, you see, ought to impart certain thermal radiation characteristics to ocean surfaces; and given Doppler effect, making those frequencies something we can properly analyze —"

"Good. Do go ahead and work on it. And if you should co-opt a few others, that'd be a help."

"Sure, we've already thought of that."

"And would you pass the word, wherever she is, Sadler ought to go to her cabin? Her boy friend's waiting with a surprise."

Williams's guffaw followed Reymont on down the corridor.

But the companionway to the bridge was empty and still; and Lindgren stood watch alone. Her hands strained around the grips at the base of the viewscope. When she turned about at his entry, he saw that her face was quite without color.

He closed the door. "What's wrong?" he asked hushedly.

"You didn't let on to anyone?"

"No, of course not, when the business had to be grim. What is it?"

She tried to speak and could not.

"Is anyone else due at this meeting?" Reymont asked.

She shook her head. He went to her, anchored himself with a leg wrapped around a rail, and received her in his arms. "No," she said against his breast. "Elof and . . . Auguste Boudreau . . . they told me. They asked me to tell . . . the Old Man. They don't dare. Don't know how. I don't either." Her fingers clutched at him until the nails bit through his tunic. "Carl, what shall we do?"

He ruffled her hair, staring across her head, feeling her tension. Again the ship boomed and leaped; and soon again. The notes that rang through her were noticeably higher pitched than before. The draft from a ventilator felt cold. The metal around seemed to shrink inward.

"Go on," he said at last. "Tell me, *alskling*."

"The universe — the whole universe — it's dying."

He made a noise in his gullet. Otherwise he waited.

At length she was able to pull far enough back from him that they could look into each other's eyes. She said in a slurred, hurried voice:

"Maybe the universe has a shorter lifespan than was thought. Or maybe we have traveled long-

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er, in cosmic time, than we knew. Fifty, a hundred billion years. I don't know. I just know what the others told me. What they have been observing. The galaxies we see are growing dimmer. As if, one by one, the stars are going out. And no new stars being formed. No new galaxies. The men weren't sure. The observations are so hard to make. But they began to wonder. And then they started checking Doppler shifts more carefully. Especially of late, when we seem to pass through so many galaxies. They found that what they observed could not be explained by any tau that we can possibly have. Another factor had to be involved. The galaxies are getting more crowded. Space isn't expanding any longer. Its reached its limit and is collapsing inward again. Elof says the collapse will go on. And on. To the end."

"We?" he asked.

"Who knows? Except that we can't stop. We could, I mean. But by the time we did, nothing would be left . . . except blackness, burned-out suns, absolute zero, death, death. Nothing."

"We don't want that," he said stupidly.

"No." What do we want? I think — Carl, shouldn't we say good-by? All of us, to each other? A last party, with wine and candle-light. And afterward go to our cabins. You and I to ours. And say good night. We have morphine for everyone. And oh, Carl, we're all so tired. It will be so good to sleep."

Reymont drew her close to him again.

"Did you ever read *Moby Dick*?" she whispered. "That's us. We've pursued the White Whale to the end of time. And now . . . that question. *What is man, that he should outlive his God?*"

Reymont put her from him, gently and went to the viewscope. Looking forth, he saw, for a moment, a galaxy pass. It must be only some ten-thousands of parsecs distant, for he saw it across the dark very large and clear. The form was chaotic. Whatever structure it had once had was disintegrated. No individual suns could be seen; those would have had to be giants, therefore young, and no young stars existed any more. The galaxy was a dull vague red, deepening at the fringes to the hue of clotted blood.

It drifted away from his sight. The ship went through another, storm-shaken by it, but of that one nothing was visible — nothing at all.

Reymont returned himself to the command bridge. Teeth gleamed in his visage. "No!" he said.

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XIII

From the dais of commons, he and she looked upon their assembled shipmates.

The gathering was seated, safety-harnessed into chairs whose legbolts had been secured at the proper places to the gym deck. Anything else would have been dangerous. Not that weightlessness prevailed yet. Between the tau which atoms now had with respect to *Leonora Christine,* and the compression of lengths in her own measurement because of that tau, and the dwindling radious of the cosmos itself, her ram jets drove her at a goodly fraction of one gee across the outermost deeps of interclan space. But oftener and oftener came spurts of higher acceleration as she passed through galaxies. They were too fast for the interior fields to compensate. They felt like the buffeting of waves; and each time the noise that sang in the hull was more shrill and windy.

Four dozen bodies hurled against each other could have meant broken bones or worse. But two people, trained and alert, could keep their feet with the help of a handrail. And it was needful that they do so. In this hour, folk must have before their gaze a man and a woman who stood together unbowed.

Ingrid Lindgren completed her relation. " — that is what is happening. We will not be able to stop before the death of the universe."

The muteness into which she had spoken seemed to deepen. A few women wept, a few men shaped oaths or prayers, but none was above a whisper. In the front row, Captain Telander bent his head and closed his eyes. The ship lurched in another squall. Sound passed by, throbbing, groaning, whistling.

Lindgren's hand briefly clasped Reymont's. "Now the constable has something to tell you," she said.

He trod a little forward. Sunken and bloodshot, his eyes appeared to regard them in ferocity. His tunic was wolf-gray, and besides his badge he wore his gun, the ultimate emblem. He said, quietly but with none of the mate's compassion:

"I know you think this is the end. We've tried and failed, and you think you should be left alone to make your peace with yourselves or your God. Well, I don't say you shouldn't do that I have no idea what is going to happen to us. I don't believe anyone can predict any more. Nature is becoming too alien to our whole past experience of it. In honesty, I agree that our

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chances do look extremely poor.

"But I don't think they are zero, either. I think we have a duty — to the race that begot us, to the children we might yet bring forth ourselves — a duty to keep trying, right to the finish. For most of you, that won't involve more than continuing to live, continuing to stay sane. I'm well aware that that could be as hard a task as human beings ever undertook. The crew and the scientists who have relevant specialties will, in addition, have to carry on the work of the ship. Which may turn out to be pretty difficult.

"So make your peace. Interior peace. That's the only kind which ever existed anyway. The exterior fight goes on. I propose we wage it with no thought of surrender."

His words rang aloud: "I propose we go on to the next cycle of the cosmos."

That snatched them to alertness. Above a collective gasp and inarticulate cries, a few stridencies could be made out: "No! Lunacy!" — "Good man!" — "Impossible!" — "Blasphemy!"

Reymont drew his gun and fired. The shot shocked them into abrupt quiet.

He grinned into their faces. "Blank cartridge," he said. "Better than a gavel. We'll discuss this in orderly fashion. Captain Telander, will you preside?"

"No," said the Old Man faintly. "You. Please."

"Very well. Comments . . . ah, probably Navigator Boudreau should speak first."

The officer said, in an almost indignant voice: "The universe took somewhere between fifty and a hundred billion years to complete its expansion. It won't collapse in less time. Do you seriously believe we can acquire such a tau that we will outlive the cycle?"

"We can try," Reymont said. The ship trembled and bellied. "We gained a few more per cent right there. As matter gets denser, we naturally accelerate faster. Space itself is being pulled into a tighter and tighter curve. We couldn't circumnavigate the universe before, because it didn't last that long, in the form we knew it. But we should be able to circle the shrinking universe again and again. I'm no expert on theoretical cosmology, but I did check with Professor Chidambaran who knows more about the subject than anyone else aboard, and he agrees. Would you like to explain, sir?"

"Yes," the Indian said, rising. "Time as well as space must be taken into account. The characteristics of the whole continuum will change quite radically. In effect, our present exponential

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increase of the tau factor in ship's time should itself increase to a much higher order." He paused. "At a rough estimate, I would say that the time we experience, from now to the ultimate collapse, will be less than three months."

Into the hush that followed, he added, "However, as I told Constable Reymont when he requested me to make this calculation, I do not see how we can survive. Apparently the theory of an oscillating universe is correct. It will be reborn. But first all matter and energy will be collected in a monobloc of ultimate density and temperature. We might pass through a star, at our present velocity, and be unharmed. But we can scarcely pass through the primordial nucleon. My personal suggestion is that we cultivate serenity." He sat down.

"Not a bad idea," Reymont said. "But I don't think that's the sole thing we should do. We should keep flying also. Bear in mind, nobody knows for sure what's going to happen. My guess is that everything will not get squeezed into a single zero-point Something. That's the kind of oversimplification which helps our math along but never does tell a whole story. I think the central core of mass is bound to have an enormous hydrogen envelope, even before the explosion. The outer parts of that envelope may not be too hot, or radiant, or dense for us. Space will be so small, though, that we can circle around and around the monobloc as a kind of satellite. When it blows up and space starts to expand again, we'll naturally spiral out ourselves. I know this is a very sloppy way of phrasing, but it hints at what we can perhaps do . . . Mr. Williams?"

"I never thought of myself as a religious man," the chemist said. It was odd and disturbing to see him so humbled. "But this is too much. We're — well, what are we? Animals. My God — very literally, my God — we can't go on . . . having regular bowel movements . . . while creation happens!"

Beside him, Emma Glassgold looked startled, then angry. Her hand shot aloft.

"Speaking as a believer myself," she said, "I must say that that is sheer nonsense. I'm sorry, Norbert, dear, but it is. God made us the way He wanted us to be. There's nothing shameful about any part of His handiwork. I would like to watch Him fashion new stars and praise Him, as long as He sees fit that I should."

"Good for you!" Ingrid Lindgren called.

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"I might add," Reymont said, "I being a man with no poetry in his soul, and I suspect no soul to keep poetry in . . . I might suggest you people look into yourselves and ask what psychological twists make you so unwilling to live through the moment where time begins again. Isn't there, down inside, some identification with — your parents, maybe? You shouldn't see your parents in bed, therefore you shouldn't see a new cosmos begotten. Now that doesn't make sense." He paused. "Of course, what's about to happen is awesome. But so was everything. Always. I never thought stars were more mysterious, or had more magic, than flowers."

Others wanted to talk. Eventually, everyone did. But their sentences threshed wearily around and around the point. It was not to no purpose. They had to unburden themselves. But by the time they could finally adjourn the meeting, Reymont and Lindgren were near a collapse of their own.

They did seize a moment's low-speaking privacy, as the people broke into small groups and the ship roared with the hollow noise of her passage. "I can't move in with you tonight after all," Reymont said. "We'd have to help move personal gear, not to mention explaining to our cabin partners, and I'm so tired I can't. Tomorrow."

"No, not then, either," Ingrid Lindgren answered. "I'm sorry, but I've changed my mind."

Stricken, he exclaimed: "You don't want to?"

"You'll never know how much I want to, darling. But can we risk it? The emotional balance is so fragile. Anything might let chaos loose in anyone of us. Suppose Elof or Ai-ling took it hard that we left . . . left now, when death is so near. The despair, maybe the suicide of a single person could bring the whole ship down in hysteria." She gripped both his hands. "Afterward, of course. When we're safe. I'll never let you go then."

"We may never be safe," he said. "Chances are we won't. I want you back before we die."

"And I want you. But we can't. We mustn't. They depend on you. Absolutely. You're the only man who can lead us through what lies ahead. You've given me enough strength that I can help you a little. But even so . . . Carl, it was never easy to be a king."

She wheeled and walked quickly from him.

XIV

Leonora Christine shouted, shuddered, and leaped.

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Space flamed around her, a firestorm, hydrogen kindled to fluorescence by that supernal sun which was forming at the heart of existence, which burned brighter and brighter as the galaxies rained down into it. The gas hid the central travail behind sheets, banners and spears of radiance, aurora, flame, lightning. Forces, unmeasurably vast, tore through and through the atmosphere: electric, magnetic, gravatational, nuclear fields; shock waves bursting across megaparsecs; tides and currents and cataracts. On the fringes of creation, through billion-year cycles which passed as moments, the ship of man flew.

Flew.

There was no other word. As far as humanity was concerned, or the most swiftly computing and reacting of machines, she fought a hurricane — but such a hurricane as had not been known since last the stars were melted together and hammered afresh.

"*Yah-h-h!*" screamed Aeropilot Lenkei, and rode the ship down the trough of a wave whose crest shook loose a foam of supernovae. The haggard men on the steering bridge with him stared into the screen that had been built. What raged in it was not reality — present reality transcended any picturing or understanding — but a representation of exterior forcefields. It burned and roiled and spewed great sparks and globes. It bellowed in the metal of the ship, in flesh and skulls.

"Can't you stand any more?" Reymont shouted from his own seat. "Barrios, relieve him."

The other flyboat man shook his head. He was too stunned, too beaten by the hour of his own previous watch.

"Okay." Reymont unharnessed himself. "I'll try. I've handled a lot of different types of craft." No one heard him through the fury around, but all saw him fight across the pitching, whirling deck, against two full gravities. He took the auxiliary control chair, on the opposite side of Lenkei from Barrios, and laid his mouth close to the pilot's ear. "Phase me in."

Barrios nodded. Together their hands moved across the control board.

They must hold *Leonora Christine* well away from the growing monobloc, whose radiation would surely kill them; at the same time, they must stay where the gas was so dense that tau could continue to increase for them, turning these final phoenix begayears into hours; and they must keep the ship riding safely through a chaos that, did it ever strike her full on, would rip her into nuclear particles. No com-

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puters, no instruments, no precedents might guide them. It must be done on instinct and trained reflex.

Slowly, Reymont entered the pattern, until he could steer alone. The rhytms of rebirth were wild, but they were there. Ease on starboard . . . vector at nine o'clock low . . . now *push* that thrust! . . . brake a little here . . . don't let her broach . . . swing wide of the flame if you can . . . Thunder brawled. The air was sharp with ozone, and cold.

The screen blanked. An instant later, every flouropanel in the ship turned simultaneously ultraviolet and infrared, and darkness plunged down. Those who lay harnessed in aloneness, throughout the hull, heard invisible lightnings walk down the corridors. Those on command bridge, pilot bridge, engine room, who manned the ship, felt a heaviness greater than planets — they could not move, nor stop a movement once begun — and then felt a lightness such that their bodies began to break asunder — and this was a change in inertia itself, in every constant of nature as space-time-matter-energy underwent its ultimate convulsion — for a moment infinitesimal and infinite, men, women, ship and death were one.

It passed, so swiftly that they were not certain it had ever been. Light came back and outside vision. The storm grew fiercer. But now through it, seen distorted so that they appeared to be blue-white firedrops that broke into sparks as they flew, now came nascent galaxies.

The monobloc had exploded. Creation had begun.

Reymont went over to deceleration. *Leonora Christine* started slowly to slow; and she flew out into a reborn light.

XV

Boudreau and Nilsson nodded at each other. They chuckled. "Yes, indeed," the astronomer said.

Reymont looked restlessly around the clutter of meters and apparatus which was the observatory. "Yes, what?" he demanded. He jerked one thumb at a screen which offered a visual display. Space swarmed with little dancing incandescences. "I can see for myself. The galaxies are still close together. Most of them are still nothing but clouds of hydrogen. And hydrogen is still quite thick between them. But what of it?"

"Computation on the basis of data," Nilsson said mysteriously. "We felt you deserved, as well as needed, to hear in confidence,

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so that you might be the one who makes the announcement."

"Well?"

"Never mind details," Boudreau said. "This result came out of the problem you set us, to find which directions the matter was headed in, and which directions the antimatter. You recall, we were able to do this by tracing the paths of plasma masses through the magnetic fields of the universe as a whole. And so this vessel is safely into the matter half of the plenum.

"Now in the course of making those studies, we collected and processed an astonishing amount of data. And here is what else we have learned. The cosmos is new, in some respects disordered. Things have not yet sorted themselves out. Within a short range of us, as such distances go, are material complexes — galaxies and proto-galaxies — with every possible velocity.

"We can use that fact to our advantage. That is, we can pick whatever clan, family, individual galaxy we want to make our goal — pick in such a way that we can arrive with zero relative speed at any point of its development that we choose. Within fairly wide limits, anyhow. We couldn't get to a galaxy which is more than about ten billion years old by the time we arrived; not unless we wanted to approach it circuitously. Nor can we overhaul any before it is about one billion years old. But otherwise, we can choose what we like.

"And . . . whatever we elect, the maximum shipboard time required to arrive, braked, will be no longer than a few weeks!"

Reymont said an amazed obscenity.

"You see," Nilsson added, "we can select a galaxy whose velocity is almost identical with ours."

"Oh, yes," Reymont muttered. "I can see that much. But I'm not used to having luck in our favor."

"Not luck," Nilsson said. "Given an oscillating universe, this development was inevitable. Or so we perceive by hindsight. We need merely use the fact.

"Best you decide on our goal," he urged. "Now. Those other idiots, they would wrangle for hours, if you put it to a vote. And every hour means untold cosmic time lost, which narrows our choices. If you will tell us what you want, we'll plot an appropriate course, and the ship can start off very shortly with that vector. The expedition will accept any *fait accompli* you hand them, and thank you for it. You know that."

Reymont ran a hand through

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his hair. It was quite gray, and his tone was always flat with weariness. "What we want is a suitable planet," he said.

"Yes," Nilsson agreed. "May I suggest a planet — a system — of the same approximate age as Earth had? Say, four or five billion years? It seems to take about so long for a fair probability of the kind of biosphere we like having evolved. That is, we could live in a Mesozoic type of environment, I suppose, but we would rather not."

"Seems reasonable," Reymont nodded. "How about metals, though?"

"Ah, yes. We want a planet as rich in heavy elements as Earth was. Not too much less, or an industrialized civilization will be hard to establish. Not too much more, or we could find numerous areas where the soil is metal-poisoned. Since higher elements are formed in the earlier generations of stars, we should look for a galaxy that will be as old, at rendezvous, as ours was."

"No," Reymont said. "Younger."

"Eh?" Boudreau blinked.

"We can probably find a planet like Earth, also with respect to metals, in a young galaxy," Remont said. "A globular cluster ought to have had plenty of supernovae in its early stages, which ought to have enriched the interstellar medium, so that G-type suns forming later would have about the same composition as Sol. As we enter our target galaxy, let's scout for such a cluster.

"But supposing we end up on a planet less well endowed with iron and uranium than Earth was . . . that won't matter. We have the technology to make do with light alloys and organics. We have hydrogen fusion for power.

"The important thing is that we be just about the first intelligent race alive."

They stared at him.

He smiled one-sidedly. "I'd like us to have our pick of planets, when we get around to interstellar colonization," he said. "And I'd like us to become the — oh, the elders. Not imperialists; that idea's ridiculous; but the people who were there first, and know their way around, and are worth learning from. Never mind what shape the younger races have. Who cares? But let's make this, as early as possible, a human galaxy, in the deepest sense of the word 'human.' Maybe even a human universe.

"I think we've earned that right."

XVI

That *Leonora Christine* took less than a month to find her

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new home was partly good fortune, but also due forethought.

The new-born atoms had burst outward with a random distribution of velocities. Thus, in the course of mega- and begayears, they formed hydrogen clouds which attained distinct individualities. While they drifted apart, these clouds condensed into sub-clouds — which, under the eons-long action of manifold forces, differentiated themselves into separate families, then separate galaxies, then individual suns.

But inevitably, in the early stages, exceptional situations occurred. Galaxies were as yet near to each other. They still contained anomalous groups. And so they exchanged matter. A large star cluster, for example, might form within one galaxy, but having more than escape velocity, might cross to another (with suns forming in it meanwhile) that could capture it.

Zeroing in on her destination, *Leonora Christine* kept watch for such a cluster: one whose speed she could easily match. And, as she entered its domain, she looked for a star of the right characteristics, spectral and velocital To nobody's surprise, the nearest one had planets.

She might then, as originally planned, have gone by at high speed, making observations while she passed through the system. But Reymont said otherwise. For this once, let a chance be taken. The odds weren't so bad. Measurements made across light-years with the newest instruments and techniques developed aboard ship gave some reason to believe that a certain child of that yellow sun might offer a good home for men.

If not — a year would have been lost, the year needed to approach light-speed again with respect to the entire galaxy. But if there actually was a planet such as lived in memory, two years would have been gained.

The gamble seemed worthwhile. Given twenty-five fertile couples, an extra two years meant an extra half hundred ancestors for the future race.

Leonora Christine found her world, that very first time.

XVIII

On a hill that viewed wide across a beautiful valley, a man stood with his woman.

Here was not New Earth. That would have been too much to expect. The river far below them was tinted gold with tiny life and ran through meadows whose many-fronded growth was blue. Trees looked as if they were feathered, in shades of the same

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color, and the wind set certain blossoms in them to chiming. It bore scents which were like cinnamon, and iodine, and horses, and nothing for which men had a name. On the opposite side lifted stark palisades, black and red, fanged with crags, where flashed the horns of a glacier.

Yet the air was warm; and humankind could thrive here. Enormous above river and ridges, towered clouds which shone silver in the sun.

Ingrid Lindgren said, "You mustn't leave her, Carl. Not in so final a way."

"What are you talking about?" Reymont retorted. "We can't leave each other. None of us can. Ai-ling understands you're something unique to me. But so is she, in her own way. So are we all, everyone to everyone else. Aren't we? After what we've been through together?"

"Yes. It's only — I never thought to hear such words from you, Carl, darling."

He laughed. "What did you expect?"

"Oh, I don't know. Something harsh and unyielding. Even cruel."

"The time for that is over," he said. "We've got where we were going. Now we have to start fresh."

"Also with each other?" she asked, a little teasingly.

"Yes. Of course. We'll need to take from the past what's good, and forget what was bad. Like . . . well, the whole question of jealously simply isn't relevant. We need to share our genes around as much as possible. Judas! Fifty of us to start a whole intelligent species again! So your worry about someone being hurt, or left out, or any such thing — it doesn't arise. With all the work ahead of us, personalities have no importance whatsoever."

He pulled her to him and chuckled down at her. "Not that we can't tell the universe that Ingrid Lindgren is the loveliest object in it," he said, threw himself down under a tall old tree, and tugged her hand. "Come here. I told you we were going to take a holiday."

Steely scaled, with a skirling along its wings, passed overhead one of those creatures called dragons.

Lindgren joined Reymont, but hesitantly. "I don't know if we should, Carl," she said.

"Why not?" he asked, surprised.

"So much to do."

"Construction, planting, everything's coming along fine. We can well afford to loaf a bit."

"But . . . all right," she said, the words hard and unwillingly brought forth. "Let's face the

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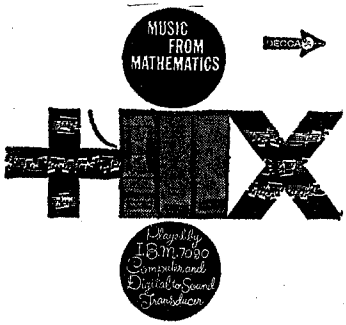

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fact. Kings get no holidays."

"What *are* you babbling about?" Reymont lounged back against the rough, sweet-scented bole and rumpled her hair, which was bright beneath the young sun. After dark, there would be three moons to shine upon her, and more stars in the sky than men had known before.

"You," she said. "They look to you, the man who saved them, the man who dared survive, they look to you for — "

He interrupted her in the most enjoyable way.

"Carl!" she protested.

"Do you mind?"

"No. Certainly not. On the contrary. But — I mean, your work — "

"My work," he said, "is my share of the community's job. No more and no less. As for any other position: if nominated I will not run; if elected I will not serve."

She looked at him with a kind of horror. "You can't mean that!"

"I sure as hell can" he answered. For a moment he turned serious again. "Once a crisis is past, once people manage for themselves . . . what better can a king do than lay down his crown?"

Then he laughed and made her laugh with him, and they were merely human. Which was enough. —POUL ANDERSON

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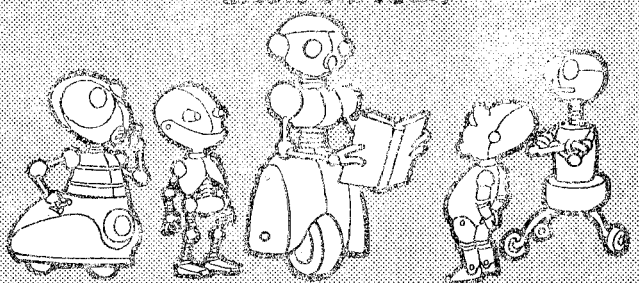
MOTHER GOOSE

A GALAXY OF ROBOTIC VERSE FOR
THE TINIEST FREETHINKERS IN THE FOUNDRY

by

JACK KIRBY



Clack and Brill went up the hill
To test their dorsal rockets.
Clack's trajection-tube was wrecked,
And Brill bent both her sprockets.

M-3 had a little cam, eccentric was its throw
And every cog that M-3 meshed
The cam would nudge off course.
Until, in cybernetics class one day, its axis slipped,
And M-3's classmates buzzed and giggled
To see her gear-teeth stripped.

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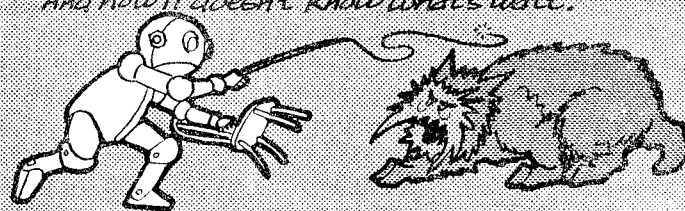
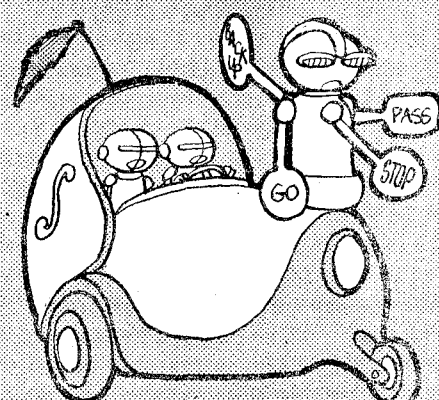
Meter, Meter; voltage eater;
Had a wire, an overheater;
He rigged a bypass at that spot,
And now it doesn't know whats watt.



Grease storage hot, grease storage cold,
Grease storage means you've got rust controlled.

Robo-Car 1-D,
Built on Monday,
Shipped on Tuesday,
Sold on Wednesday,
Driven on Thursday,
Wrecked on Friday,
Hauled on Saturday,
Scrapped on Sunday,
That is the end of Robo-Car 1-D.



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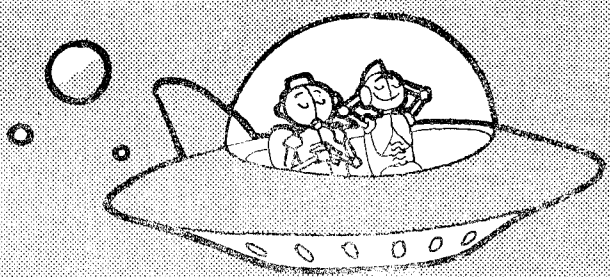

To Mars, to Mars, to Marsport, where martians are amassed!
Help us defeat the Martians at Zippity-Blast!
To Mars, to Mars, to Marsport, where aliens fall like chaff!
To see you there, getting there, Epitty-Zaph!

There was a Martian Lucell,
[illegible] in silver foil
[illegible] the middle of her winding,
[illegible] was very, very dull,
But when she got [illegible] she was blinding!

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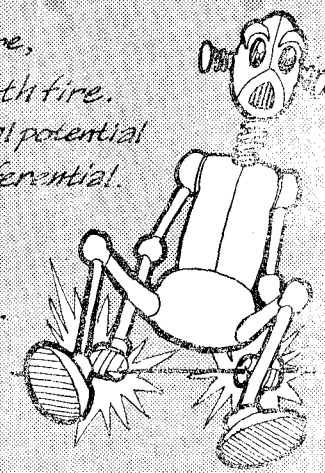
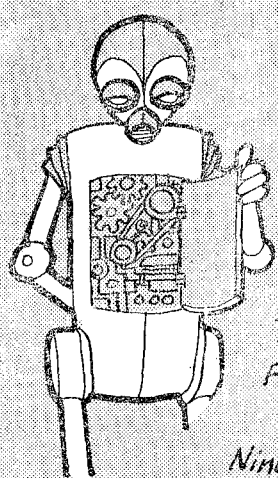
Hobart Robot sat on the wire,
Hobart Robot flickered with fire.
All his transistors and eygal potential
Couldn't repolarize his differential.



Rigor we trigger re shock:
A gauss runs down a clock.
In iron wheels,
Its field congeals.
Rigor we trigger re shock.



One-Two, tighten my screw,
Three-Four, smelt the ore,
Five-Six, Geiger clicks,
Seven-Eight, bolt my plate,
Nine-Ten, we move like men,
Eleven-Twelve, tapes we shelve,
Thirteen-Fourteen, data sorting,
Fifteen-Sixteen, radar-fix screen,
Seventeen-Eighteen, populating,
Nineteen-Twenty.. Man: Where won't he?

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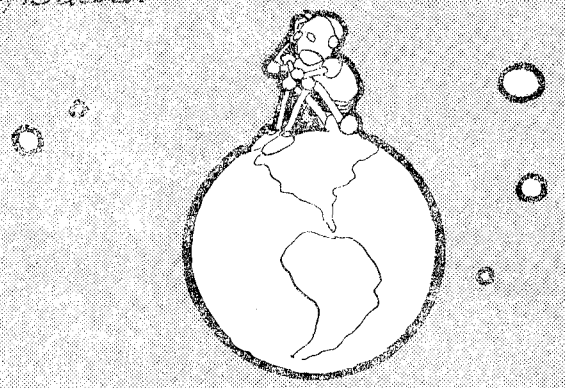
Sing a song of space-race, of rockets roaring high,
Fusion-powered platforms that climbed up the sky.
Sent apart by fallout, the ionosphere recoiled...
Wasn't that a shrieky week before the oceans boiled?
The men were at their battle-fronts (inhabited for years),
The women (tired of motherhood) were seeking out careers,
The robots shone as silver, and each solar ray we shed
When along came the black-burns that cooked the People dead.



Little bolts, weep; we've lost our people—
They don't know where to find them.
We're left alone in their old home;
They left only their tales behind them.

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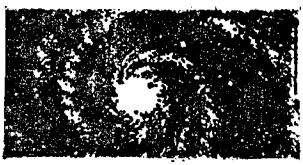

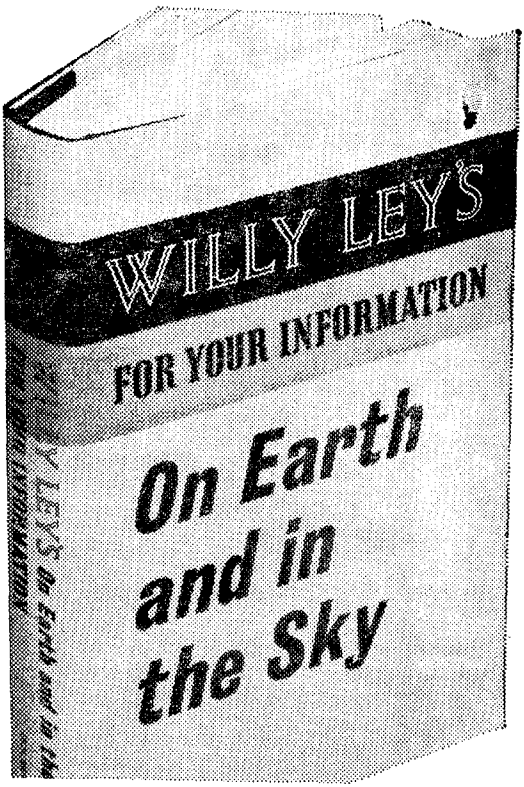

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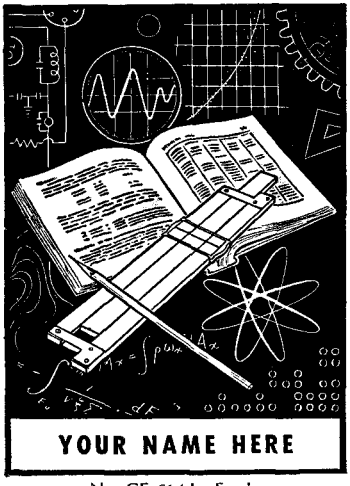

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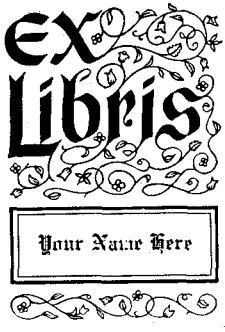

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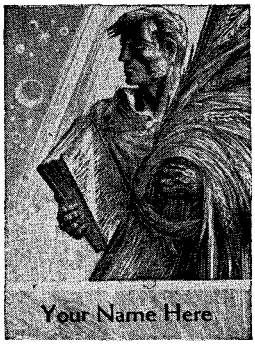

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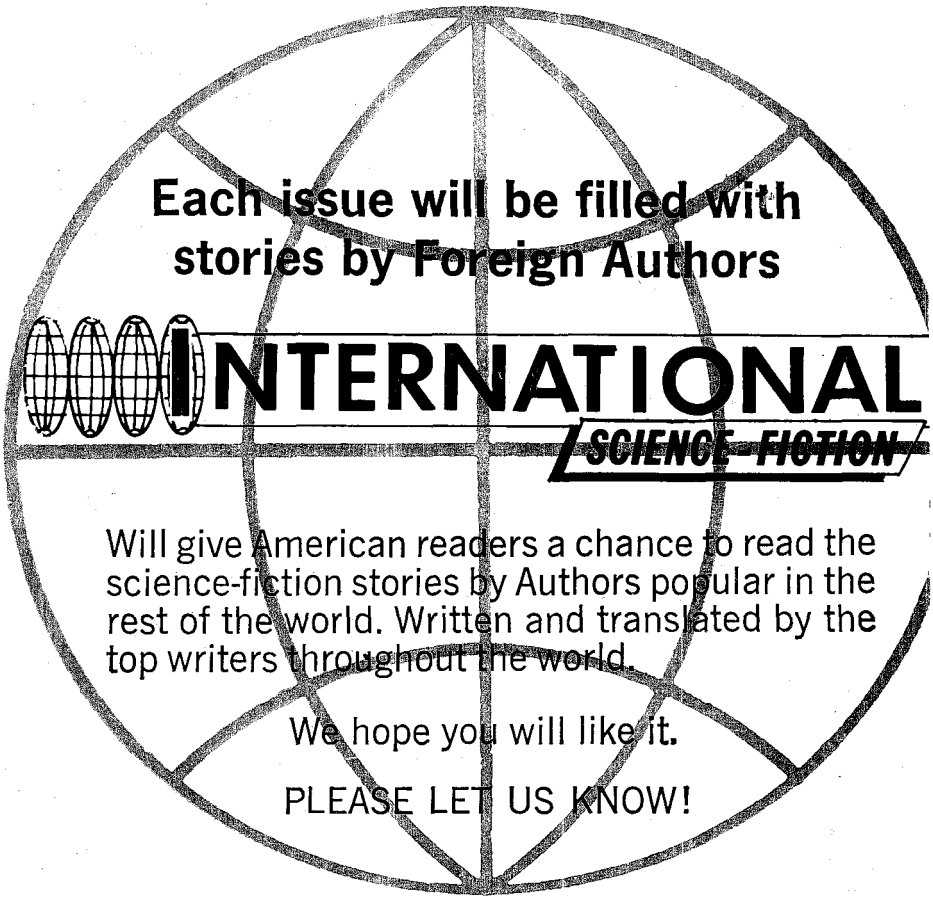

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